

**MASTER OF SCIENCE IN
FINANCE**

**MASTER'S FINAL WORK
PROJECT**

**EQUITY RESEARCH:
DEUTSCHE LUFTHANSA AG**

LUÍS MIGUEL ROCHA SANTOS PALMA DE FIGUEIREDO

OCTOBER 2016

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**SUPERVISOR:
VICTOR MAURÍLIO SILVA BARROS**

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Abstract

This project contains a detailed evaluation of Deutsche Lufthansa AG, according to ISEG's Master in Finance final work project. This report was written in accordance with the recommendations of the CFA Institute. The reason for choosing the company was the interest in the presentation of Deutsche Lufthansa on the trip to Frankfurt conducted by ISEG master in finance, and the interest for the airline industry in general. This report was written in accordance with the public information available on September 23th, 2016, any information or event subsequent to this date has not been considered. The target price was obtained using an absolute valuation method, more specifically the method of Discounted Cash Flow (DCF), complemented by a relative valuation method, more specifically, the method of Comparable Multiples. With a price target of € 14.43 at the end of 2016, representing an upside potential of 37.51% from the current price of € 10.49, our final recommendation for Deutsche Lufthansa AG is to Buy, despite the risks that may occur such as the increase in fuel prices or the increase in the market risk premium that can strongly affect the price target. Our risk assessment estimates a medium risk for the company.

JEL classification: G10; G32; G34.

Keywords: Equity Research; Valuation; Mergers & Acquisitions; Deutsche Lufthansa AG; Airline Industry.

Resumo

Este projecto contém uma avaliação detalhada da Deutsche Lufthansa AG, de acordo com o projecto de trabalho final do programa de Mestrado de Finanças do ISEG. Este relatório foi elaborado de acordo com as recomendações do CFA Institute. O motivo pela escolha da empresa deveu-se ao interesse na apresentação da Deutsche Lufthansa na viagem a Frankfurt conduzida pelo Mestrado de Finanças do ISEG e pelo gosto pela indústria aérea no geral. Este relatório foi elaborado de acordo com a informação pública disponível a 23 de Setembro de 2016, qualquer informação ou evento posterior a esta data não foi considerada. O preço-alvo foi obtido utilizando um método de avaliação absoluto, mais especificamente o método dos Fluxos de Caixa Descontados (DCF), complementado por um método de avaliação relativo, mais especificamente, o método dos múltiplos comparáveis. Com um preço-alvo de € 14.43 no final de 2016, representando um potencial de valorização de 37.51% face ao preço corrente de € 10.49, a nossa recomendação final para a Deutsche Lufthansa AG é de Compra, apesar dos riscos que possam ocorrer como o aumento do preço dos combustíveis ou o aumento do risco de mercado que podem afectar fortemente o preço-alvo. A nossa avaliação de risco estima um risco médio para a empresa.

Classificação JEL: G10; G32; G34.

Palavras-Chave: Equity Research; Avaliação de Empresas; Fusões e Aquisições; Deutsche Lufthansa AG; Indústria Aérea.

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This Project represents the end of an important stage of my life, filled with much effort, dedication and hard work. However, none of this would be possible without the support of my family, girlfriend, professors and friends.

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I also want to dedicate this project to my Grandfather Luís Figueiredo for being an inspiration in my life and to my Grandfather António Santos for making this project possible that motivated me to do my best.

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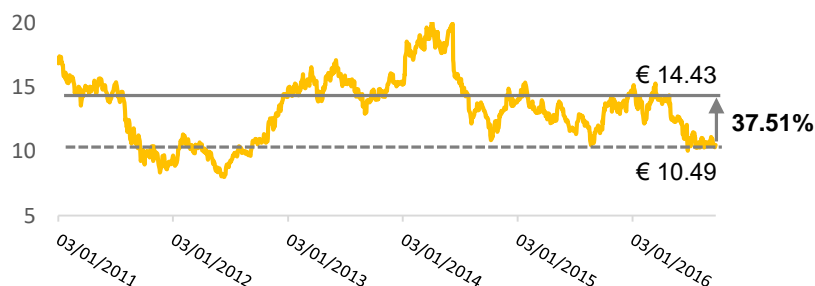
LHA: Consistently safeguarding the future

(YE2016 Price Target of € 14.43 (+37.51%); recommendation is to Buy)

1. Research Snapshot

BUY is our recommendation for Deutsche Lufthansa AG (LHA), with a price target of € 14.43 at the end of 2016, using the discounted cash flow method. Relative valuation through multiples supports our view that LHA is currently undervalued. This offers a potential 37.51% upside gain from its latest closing price of € 10.49 although with medium risk.

Figure 1: Share Price
Source: Reuters



Passenger Airline group segment is the main driver of the group performance with 74.30% share of group revenue. We anticipate an increase in traffic revenue in this segment due to favorable passenger yields and fuel prices, along with the good performance of the airline industry. LHA's EBIT is expected to increase until 2017, and then to decline, due to the increase in costs in general and the deceleration of revenues driven by the slowdown in German GDP.

The airline industry is now in the stage of maturity, where the level of profit is beginning to decline and competition becomes aggressive. In order to gain more market share, LHA intends to make considerable investments.

One large investment is in the fleet, by replacing older aircrafts with new ones, increasing the seat capacity without increasing the total size of the fleet and by renewing the cabin layouts. Another is to invest in the low-cost segment, through the development of Eurowings, in order to face the fierce competition from the low-cost airline companies. With these investments we believe that LHA will outperform the industry in the medium term.

Table 4: LHA sensitivity Analysis
Source: Author, Company Data

Change in percentage of aircraft fuel and lubricants											
14.43 €	22.34%	22.44%	22.54%	22.64%	22.74%	22.84%	22.94%	23.04%	23.14%	23.24%	23.34%
Price	18.98 €	18.08 €	17.17 €	16.26 €	15.34 €	14.43 €	13.51 €	12.58 €	11.66 €	10.73 €	9.80 €
Change (%)	31.60%	25.32%	19.01%	12.69%	6.36%		-6.37%	-12.76%	-19.17%	-25.60%	-32.05%

Table 1: Analyst's Risk Assessment
Source: Author

Low	Medium	High

Our risk assessment estimates a medium risk for LHA

Table 2: Market Profile
Source: Reuters

Previous close price	10.46 €
Open price	10.41 €
Closing price	10.49 €
High	10.51 €
Low	10.36 €
52-wk High	15.41 €
52-wk Low	9.90 €
Volume	3,224,520
Shares outstanding (€m)	466.15

Figure 2: EBIT estimations
Source: Author, Company Data

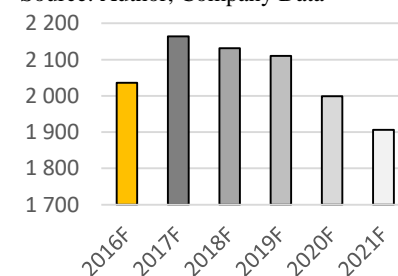


Table 3: Valuation Output
Source: Author, Company Data

Valuation	2016F Target Price
DCF	14.43 €
Multiples (average)	16.60 €
EV/EBITDA	15.80 €
P/E	17.40 €

2. Business Description

Deutsche Lufthansa AG (LHA), also known by Lufthansa Group, is a global aviation group with a total of 540 subsidiaries and equity investments, organized into four main business segments: passenger airline group; logistics; maintenance, repair and overhaul services (MRO) and Catering (Figure 3). The leading position in all market segments, makes LHA the world's leading aviation group.

The company was founded as "Luftag" on January 6th, 1953 with headquarters in Cologne. Later, in 1954 the company changed its name to "Deutsche Lufthansa AG". LHA started its operations in 1955. During its activity, the group, formed an important commercial alliance called "Star Alliance", and bought other important airline companies, Swiss Airlines in 2005, Brussels Airlines in 2008 and Austrian Airlines in 2009.

Currently, LHA has an important operations base at Frankfurt Airport, called Lufthansa Aviation Center (LAC) and basis hubs in Munich, Vienna and Zurich, with a total average of 119,559 employees (Figure 4) and a total fleet of 600 aircrafts (table 5) by the end of 2015.

The **Passenger airline Group Segment** is the core segment of LHA, representing 74.3% share of group revenue. The Hub airline companies: Lufthansa Passenger Airlines, Swiss Airlines and Austrian Airlines, as well as, the low-cost companies: Germanwings and Eurowings, together with investments in Brussels Airline and SunExpress, complete the airline portfolio (appendix 10). The large fleet offers a global route network of 297 destinations in 89 countries, with main routes in Germany, Austria, Belgium and Switzerland.

Lufthansa Cargo, is the responsible for the **Logistics Segment**, representing 7.3% share of group revenue. The focus of this business segment, is in the airport-to-airport airfreight business. The transport of animals, valuable cargo, and dangerous goods, are some examples, of the portfolio of products that Lufthansa Cargo is used to carry.

Lufthansa Technik, provides a range of services in the **MRO Segment**, such as; maintenance, components, aircraft systems and completion and servicing of VIP aircraft, that can be provided individually, or for the entirely fleet. This business segment represents 10.2% share of group revenue.

The **Catering Segment**, through LSG Sky Chefs, offers both catering products and in-flight services, such as entertainment programs, food and drinks. It represents 7.4% share of group revenue. This Business Segment, together with the MRO segment, are support segments that can be provided for LHA itself or other companies.

The remaining 0.8% share of group revenue, is due, essentially, by the successor companies of the former IT services, the Central group functions and by Airplus. All together, these companies, form the **Other Segment**.

LHA exhibit a **vertical structure** in which the passenger airline group is the core segment followed by the logistics segment with the MRO and Catering being support segments. The performance of the passenger airline group is the main driver of the group's revenue.

Figure 3: LHA Segments
Source: LHA Annual Report 2015

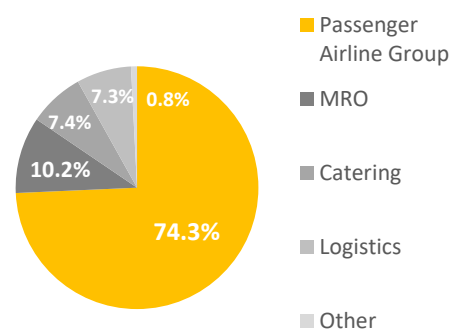


Figure 4: Total average number of Employees
Source: LHA Annual Report 2015

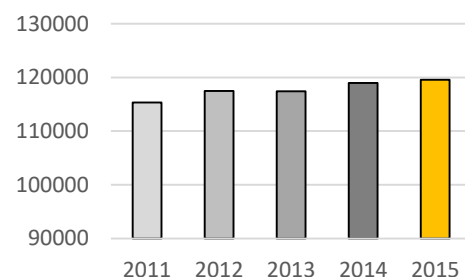


Table 5: LHA Fleet
Source: LHA Annual Report 2015

Company	Fleet size
LHA Passenger Airlines	414
Swiss Airlines	88
Austrian Airlines	79
Lufthansa Cargo	19
Total fleet	600

Company Strategies

Improving the customer experience: the customer satisfaction is a big concern to LHA. In order to guarantee a better experience, measures are taken as: **expanding the route network** and **investing in new fleet**, by replacing the older aircraft by recent ones and by **renewing the cabin layouts**. Offering **personalized products and services** also improves the customer satisfaction.

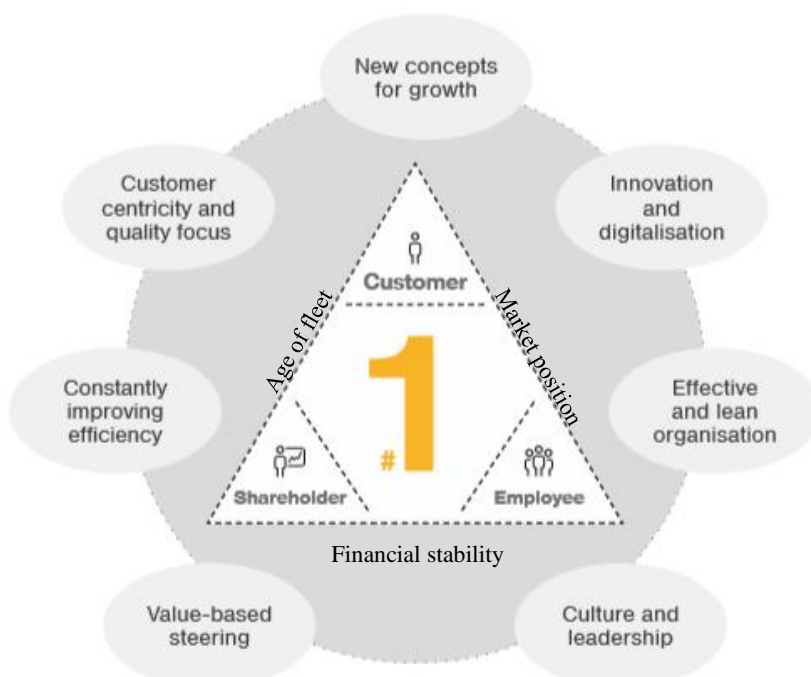
Investment in the Low-Cost Segment: one big strategy is the investment in the Low-Cost Segment, by the development of Eurowings. The goal is to be the lead company in point to point transit, offering efficiency with competitive costs. It started by incorporate a large part of the Germanwings' route network, as this brand will be integrated into Eurowings during 2016. The target are the price-sensitive customers. LHA will gain new customers with this low cost investment, by entering into a new customer segment, but this strategy will cannibalize costumers from the Hub airlines. The goal is to generate growth over the medium term and to grow faster than the average. It is expected for Eurowings, to have a slightly negative adjusted EBIT for the first year, mainly due to the costs of expanding the company.

Upgrading the Aviation Services: upgrading the business segments: MRO, Catering, Logistics and others, focusing on the quality of services, via partnerships or acquisitions, to maintain a leading position in the market and to create a higher added value for the customer.

Financial Strategy: maintain a good credit rating; have a minimum liquidity of 2.3 billion euros at all times; achieve an equity ratio of 25% in the medium term; maintain a largely unencumbered fleet; achieve a debt repayment ratio of 45 to 35 per cent; achieve a regular dividend ratio of 10 to 25 per cent of EBIT and hedge against financial risks (in particular: Fuel, exchange rate and interest rate risk).

To fulfil these strategic objectives, LHA initiated a program in 2014 named "7to1 – Our Way Forward" strategic program (figure 5). This program is applied across the group, in all group segments, to ensure an optimal structure and governance for the entire group.

Figure 5: "7to1 – Our Way Forward" Strategic Program
Source: LHA Annual Report 2015



3. Management and Corporate Governance

LHA follows an **Anglo-Saxon Model**, which includes a Board of directors, an Audit Committee and a statutory Auditor (Pwc).

The **Board of Directors** is organized into two principal boards, that work closely in order to achieve a higher value to the company: the **Supervisory Board** (which includes a Steering Committee, a Nomination Committee and an Arbitration Committee), that is responsible for the management of the company, and the **Executive Board**, that is responsible for taking decisions, which, are taken, by the voting members. LHA, acts in compliance with the German Corporate Governance Code, with the exception that the ancillary benefits are not capped.

Board Members

The **Supervisory Board** is composed by the honorary chairmen, Wolfgang Röller and Jürgen Weber, together with the 23 voting members, among them, **Wolfgang Mayrhuber**, serves as Chairman of the supervisory Board. He studied Mechanical Engineering at the Technical College in Austria and at the Bloor Institute in Canada, he also has an Executive Management Training course at the Massachusetts Institute of Technology (MIT) in Boston and is a board member since 2013. **Christine Behle**, serves as Deputy Chairwoman and employee representative. He is graduated in business administration and is a board member since 2013.

The **Executive board** is composed by **Carsten Spohr**, serves as Chairman of the Executive Board and CEO. He is graduate in industrial engineering from Karlsruhe University and is a board member since 2011. **Karl Ulrich Garnadt**, serves as Chief Officer Lufthansa German Airlines (including Eurowings), is a board member since 2014. **Harry Hohmeister**, serves as Chief Officer Group Airlines, Logistics and IT (including Hub Management). He has a diploma in commercial air transportation and is a board member since 2013. **Simone Menne**, serves as Chief Officer Finances and Aviation Services. She has a degree in business administration and is a board member since 2012. **Bettina Volkens**, serves as Corporate Human Resources and Legal Affairs. She has a doctorate in Law and is as board member since 2013.

The Board members remuneration can be seen in tables 6 and 7.

This **Governance structure**, is suitable for this company. It prevents the situation that a member of the Board of Directors acts in their own interest, because it is always necessary to have the consent of a majority of the voting members of the executive board. This protects the shareholders for decisions that could affect the company. The specialized committees, also have an important participation as controlling the nominations, auditing and recommending the board of directors, preventing other similar cases.

Table 7: Executive Board Remuneration

Source: Company Data

in € thousands

Executive Board	Total remuneration
Carsten Spohr	2,674.00 €
Karl Ulrich Garnadt	1,783.00 €
Harry Hohmeister	1,396.00 €
Simone Menne	1,910.00 €
Dr Bettina Volkens	1,842.00 €
Total	9,605.00 €

Table 6: Supervisory Board Remuneration

Source: Company Data

in € thousands

Supervisory Board	Total Remuneration
Wolfgang Mayrhuber	300.00 €
Christine Bele	140.00 €
Jacques Aigran	26.00 €
Nicoley Baublies	54.00 €
Dr Werner Brandt	160.00 €
Jörg Cebulla	12.00 €
Herbert Hainer	80.00 €
Dr Jürgen Hambrecht	0.00 €
Uwe Hien	36.00 €
Dr h.c. Robert Kimmitt	80.00 €
Dr Karl-Ludwig Kley	120.00 €
Martin Koehler	110.00 €
Doris Krüger	89.00 €
Dr Nicola Leibinger-Kammüller	80.00 €
Eckhard Lieb	110.00 €
Jan-Willem Marquardt	104.00 €
Ralf Müller	80.00 €
Monika Ribar	110.00 €
Ilona Ritter	0.00 €
Andreas Strache	80.00 €
Stephan Sturm	54.00 €
Christina Weber	80.00 €
Birgit Weinreich	82.00 €
Matthias Wissmann	80.00 €
Stefan Ziegler	85.00 €
Total	2,152.00 €

The **Shareholder Structure** is divided into two main types of investors, the **institutional investors** (don't have to be necessarily from the airline industry, for example, Investment firms and funds), with 53.9% of the shares, and the **private individuals**, with 46.1% of the Shares (Figure 6). The management Team holds less than 1% of all shares issued by the company. LHA Shares are majority held by German Investors, with a total of 74.9% of the shares (Figure 7). These shares are all registered, with transfer restrictions to ensure that, the majority of Lufthansa investors, are from Germany, as German Aviation Compliance Documentation Act (LuftNaSig) stipulates. Every share has equivalent voting rights.

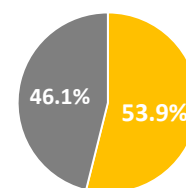
This **Shareholder Structure** is also suitable for this company. As LuftNaSig stipulates, the company has the power to monitor the share ownership at any given time, preventing hostile takeovers. The major shareholders of the Lufthansa Group can be seen in table 8.

Table 8: LHA Major Shareholders
Source: Reuters

Investor Rank	Investor Name	% Outstanding	Position	Country
1	Templeton Investment Counsel, L.L.C.	5.00%	23226938	United States
2	BlackRock Asset Management Deutschland AG	3.13%	14540036	Germany
3	Capital Research Global Investors	2.94%	13663966	United States
4	Norges Bank Investment Management (NBIM)	1.63%	7563507	Norway
5	Deutsche Asset Management Investment GmbH	1.44%	6671328	Germany
6	Frankfurt-Trust Investment-Gesellschaft mbH	1.13%	5235000	Germany
7	Deka Investment GmbH	0.97%	4505621	Germany
8	The Vanguard Group, Inc.	0.96%	4479391	United States
9	Dimensional Fund Advisors, L.P.	0.83%	3835462	United States
10	BlackRock Institutional Trust Company, N.A.	0.77%	3597174	United States
11	McKinley Capital Management, LLC	0.67%	3106005	United States
12	Franklin Templeton Investment Management Ltd.	0.63%	2923141	United Kingdom
13	Templeton Global Advisors Ltd	0.57%	2646620	Bahamas
14	DB Platinum Advisors	0.54%	2521028	Luxembourg
15	Carmignac Gestion	0.51%	2372137	France
16	Goldman Sachs Asset Management (US)	0.50%	2339565	United States
17	NFJ Investment Group LLC	0.46%	2156834	United States
18	AQR Capital Management, LLC	0.38%	1751644	United States
19	Commerz Funds Solutions S.A.	0.37%	1738319	Luxembourg
20	Franklin Advisers, Inc.	0.33%	1546030	United States

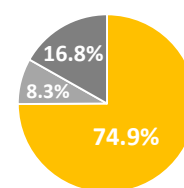
LHA focus on **Sustainable and Responsible Business**. Comply with the world's largest initiative for responsible company management (UN Global), and with the German Corporate Governance Code, reflects the **Corporate Responsibility** of the Group. Studies, in reduction the fuel consumption, emissions and noise abatement, are some examples of the measures taken, in order to improve the environmental impact. One of the biggest measures was the huge investment in a state-of-the-art low-emissions fleet, to improve ecological sustainability.

Figure 6: Types of Shareholders
Source: LHA Annual Report 2015



■ Institutional Investors ■ Private Individuals

Figure 7: Shareholders' Nationality
Source: LHA Annual Report 2015



■ Germany ■ USA ■ Other

4. Industry Overview and Competitive Positioning

Economic Outlook

The **Global Economic outlook** is favorable. Almost 1% of the **World GDP** is spent on air Transportation. In 2012, the World GDP dropped as a result of the global crisis. In 2015, the estimated growth of 3.09% was slightly less than in 2014 (figure 8), due to political and financial crises and to the deceleration of China's economic activity. For the coming years, the world GDP is expected to grow steadily, between 3 and 4 per cent.

The **German Economic outlook** is favorable. Germany is the euro's area biggest economy, with a stable growth over the recent years (figure 9). In 2012, the **German GDP** had a huge drop, due to the Euro Zone debt crisis, loss of confidence on financial markets and political problems. Nevertheless, recently, Germany achieved a moderate and stable growth after the recovery in 2014. This outlook is due to the positive financing and labor market conditions, high net migration, low oil prices, benefits from unprecedented stimulus by the European central bank and by the growth of domestic demand. However, Germany could be affected by the slow growth of China economy (due to the trade exposure) and by the inflow of refugees. For the coming years, the German GDP, is expected, to continue to grow in the short term and to decline slightly in the medium term. On the other hand, the **German Inflation Rate** has been falling since 2012 (figure 10), mainly due to the sharp drop in energy costs, however, it is expected to increase in the following years.

Market Analysis

Oil Prices have a big impact on the company accounts, being the second large expense (17.2% of LHA operating expenses). We can distinguish two types of oil used in the airline companies: **Brent Crude**, a light and sweet oil, from oil fields in North Sea, ideal for refining into gasoline and **Jet Kerosene**, a type of substance that comes from crude oil distillation, ideal to be used as Jet Fuel for Jet aircraft. These two types of oil are normally correlated and priced in US dollars. In 2015, the price decreased sharply (figure 11), due to the oversupply and declining demand of crude oil, mainly as a result of the growth of EUA and Iraq as a producer, the return of Iran to the oil market, the overproduction of the OPEC oil cartel, the appreciation of the U.S. Dollar and the deceleration of China's economy. This fall on oil prices contributed significantly to LHA's better results. In order to reduce exposure to fluctuations in fuel prices, airline companies usually practice **Fuel Hedging** by buying or selling expected future oil prices through investment tools such as swaps contracts, call options, among others. These hedges are mainly in crude oil.

LHA performs in a time horizon of up to 24 months (by definition, 5% of exposure is hedged monthly) with a maximum hedging level of 85% in each month, depending on the company in the Group. For 2016 the current fuel hedging level is about 76% (figure 12). It is expected that oil prices remain low in the short term and to go up slightly in the medium term.

Figure 12: Current Fuel Hedging Level
Source: LHA Annual Report 2015

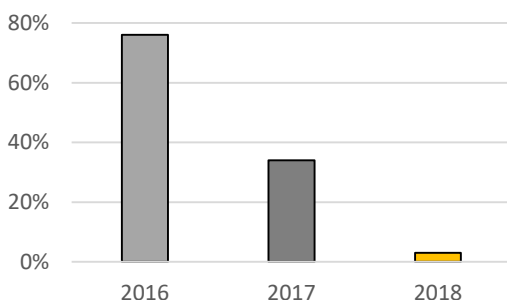


Figure 8: World GDP Growth
Source: IMF

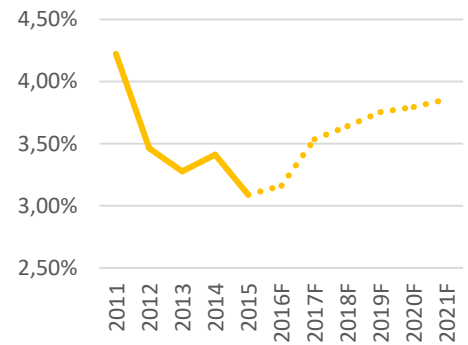


Figure 9: German GDP Growth
Source: IMF

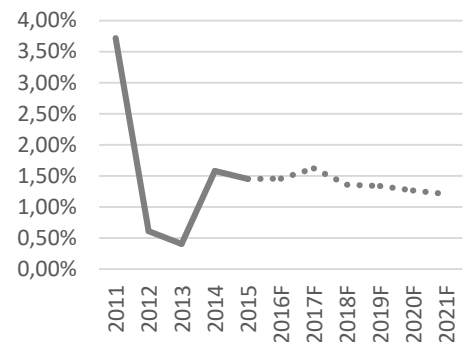


Figure 10: German Inflation rate
Source: OECD Data and PWC projections

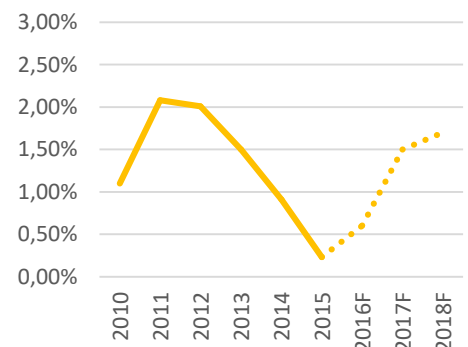
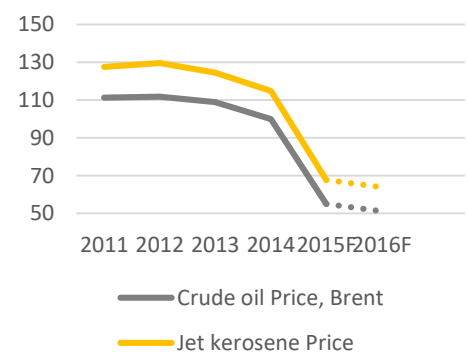


Figure 11: Oil Prices Development (\$/barrel)
Source: IATA



Airline companies are very dependent on **Interest Rates**, due to the fact that part of the fleet is financed by bank loans and credit. In the case of LHA, a vast majority of the aircraft fleet is unencumbered and wholly owned by the group, only 9.33% of the fleet is financed by operating and finance lease (figure 13).

In Euro-Area, **short term interest rates** (3 Months Euribor) and **long term interest rates** (10 Years Bunds) have been declining (figure 14) as a result of the rate cuts by the European Central Bank (ECB), in order to increase private spending, economic growth, investment and inflation. This drop means better results for the airline companies. It is expected that interest rates remain low for the coming years.

LHA uses Interest rate swaps and interest rate currency swaps to manage interest rate risks. The group aims to finance 85% of its financial liabilities at floating rates of interest. It is required, for the company, to reduce both long term interest expenses and earnings volatility. The Ratio of floating to fixed interest rates for long term borrowing can be seen in figure 15.

The main financing instruments used by LHA are Bonds, Liabilities to banks and Leasing liabilities (table 9).

Table 9: LHA financing structure
Source: LHA Annual report 2015

in €m			
Borrowings	Non-Current	Current	Total
Bonds	998 €	751 €	1,749 €
Liabilities to banks	949 €	130 €	1,079 €
Leasing Liabilities and other loans	3,084 €	458 €	3,542 €
Total	5,031 €	1,339 €	6,370 €
% of Total	78.98%	21.02%	100.00%

Since LHA has international operations through a global route network, it means that the company is exposed to exchange rate fluctuations. The **Exchange Rates** have a considerable impact on revenues. In 2015, the Euro depreciated against all the main currencies (table 10) as a result of the ECB's quantitative easing program to purchase government bonds in order to reduce their yields, resulting in an increase in the money supply, and due to the cut rates, that pushed the interest rates to a record-low in order to fight the Eurozone's deflation. For an airline company, favorable exchange rates means better results due to the great impact they have on the company's accounts. In this case, a strong currency is preferred.

It is important to consider two situation: (i) LHA could be affected by the pound sterling devaluation due to the Britain's exit from European Union (Brexit); (ii) Since the fuel is priced in US dollars, it may represent a large cost associated with the purchase of fuel depending on the US dollar appreciation against the euro.

Table 10: Yearly average exchange rate
Source: USForex

EUR 1	2013	2014	2015
USD	1.33	1.33	1.11
CHF	1.23	1.21	1.07
GBP	0.85	0.81	0.73
CNY	8.17	8.19	6.97
JPY	129.71	140.42	134.32

Figure 13: Financed Fleet
Source: LHA Annual report 2015

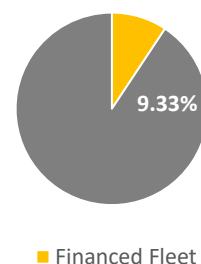


Figure 14: Interest Rates
Source: Eurostat, OECD Data

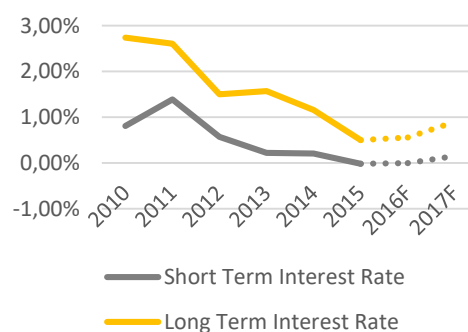
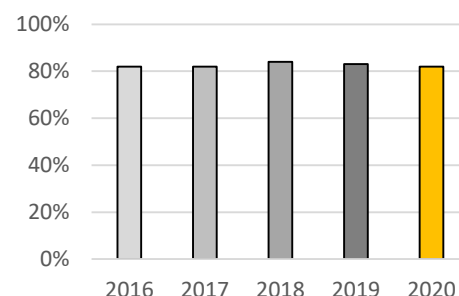


Figure 15: Ratio of floating/fixed interest rates
Source: LHA Annual report 2015



LHA is exposed to about 66 foreign currencies. The Group uses currency futures and currency options to hedge exchange rates exposure for 20 of the currencies, over a period of 24 months with a hedging level depending on the currency. Spread options and futures can also be used as hedging instruments. For 2016 the current hedging level is 87% (figure 16). In table 11 we can see the forecast of EUR/USD for the coming years.

Table 11: EUR/USD Forecast
Source: Deutsche Bank

Year	2016F	2017F	2018F	2019F
EUR/USD	0.90	0.85	1.00	1.10

Airline Industry

The Airline Industry is a significant driver for the Worldwide Economy, either by creating jobs, providing capital or increasing connections that enables the flow of goods, people and technology. This industry is characterized by intense competition, large costs and reduced profit margins.

The bet on **Low-Cost Carriers (LCC's)** proved to have a big impact on the Airline Industry, with an actual worldwide Air Share of 25% (figure 17). The rise of the LCC's is justified by the preference of a large part of consumers for competitive prices over some comfort, especially in emerging economies. These type of companies, usually do not provide some services such as inflight meals and drinks, generally own relatively newer aircraft of a single type and operate at smaller airports. Airline Companies like Easyjet and Ryanair, are some examples of LCC's that had a considerable growth in recent years. These LCC's focus on cost reductions and control, in order to offer competitive prices and low fares to costumers.

In contrast, **Luxury Airline Companies** like Emirates or Qatar Airways are also growing but with a lower impact than the LCC's thanks to the niche of consumers who prefer to spend money in comfort and luxury. These companies must maintain a high service standard in order to add more value to the customer experience by having the best technology, authentic quality and excellence.

Between these two categories, we can highlight the **Hub Airline Companies** like Deutsche Lufthansa AG, Turkish Airlines and Air France-KLM, among others. These airline companies focus on the equilibrium price-quality. Due to the intense competition these companies face, it is necessary to reduce costs in order to have competitive prices without compromising quality of service.

In this Industry it is important to pay attention to yields, more precisely to Passenger and Cargo Yields. **Passenger Yield** is the average fare paid by customers to fly one mile. **Cargo Yield** is the average price paid by customers to transport one ton of freight and mail one mile. Both Yields dropped in 2015 (figure 18) due to the declining of prices and surcharges. The goal of airline companies is to stabilize these yields, preventing its descent.

Drivers of costs

Staff Cost is the biggest cost of an Airline Company. The staff cost is directly related to the number of employees. Since the average number of employees in LHA has been growing in the last recent years, consequently, staff costs are rising too. Another huge cost are the **Fees and Charges** that Airline Companies must support such as Air Traffic Control Charges, Landing Fees, Handling Charges, Security Fees, Passenger Fees and Fees for Airport Infrastructure. In 2015, Fees and Charges went up by 7.3% due to volumes, prices and exchange rate movements. These two costs together with the **cost of Fuel**, are the main costs of an airline company (figure 19).

Figure 16: Current Exchange Rate Hedging Level
Source: LHA Annual report 2015

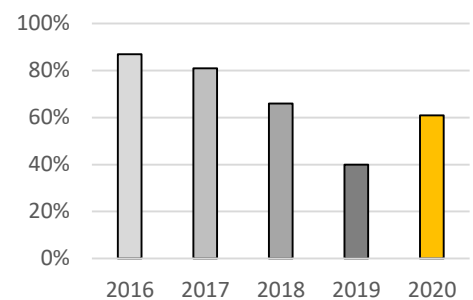


Figure 17: Air Share
Source: Strategy&

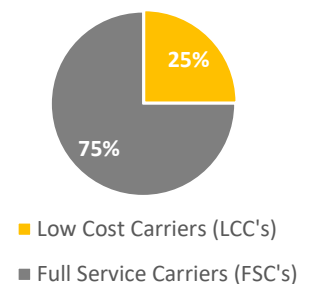


Figure 18: Passenger and Cargo Yields
Source: IATA

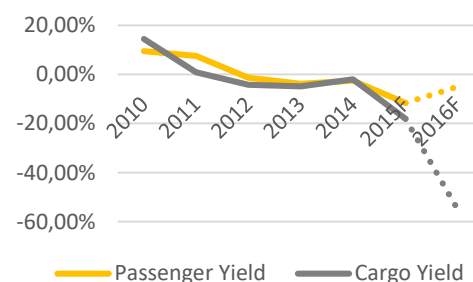
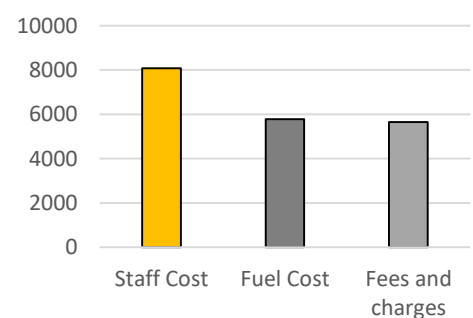


Figure 19: LHA's Main Costs (in €m)
Source: LHA Annual report 2015



Demand and Supply

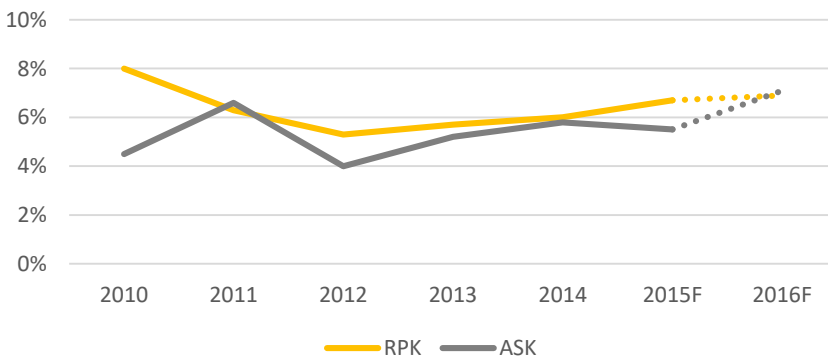
The passenger traffic has been growing for the past recent years, reaching a total of 3545 million **Passenger Departures** in 2015 (figure 20). Cargo business is also growing, but with a lower impact than the passenger traffic, reaching a total of 51.3 million of **Freight Tones** in 2015 (figure 21). The growth of the airline industry also increases indirectly the airline services MRO and Catering that are correlated with the Passenger Airlines and Cargo Segments growth.

One important feature of this sector is the **Geographic Position**. Some regions are more propitious than others due to economic context and local demand. North America Region performs the best followed by Europe Region (table 12). The weakest Region is Africa thanks to political and regional conflicts.

One way to analyze the **Demand and supply** is to looking at the variables: **Revenue Passenger Kilometers (RPK)**, measures the actual passenger traffic; **Available Seat Kilometers (ASK)**, measures the available passenger capacity; and **Passenger Load factor (PLF)**, measures the percentage of ASK used.

It is expected that passenger traffic (demand) will continue to grow steadily and passenger capacity (supply) to grow significantly (figure 22), which can mean more airplanes in the air or a better efficiency by upgrading airplane cabin layouts. The Percentage of ASK used has improved in recent years (figure 23) which means a better allocation of available seats for passenger. In the summer, demand usually increases due to leisure travelers.

Figure 22: Change of Demand and Supply
Source: IATA



LHA expects an increase in ASK of 6.6% and consequently in RPK, along with an increase in the number of flights by 2.3%, as a result of the planned capacity expansion of Swiss and Austrian Airlines by increasing the number of flights and operating larger aircrafts, as well as the growth of Eurowings, through the expansion and replacement of short and long-haul fleet.

Although the expected increase in the worldwide freight tones, we expect the Logistics Segment to decrease in the medium term mainly due to the challenging market and the large drop in cargo yields for 2016.

Figure 20: Worldwide Passenger Departures (millions)
Source: IATA

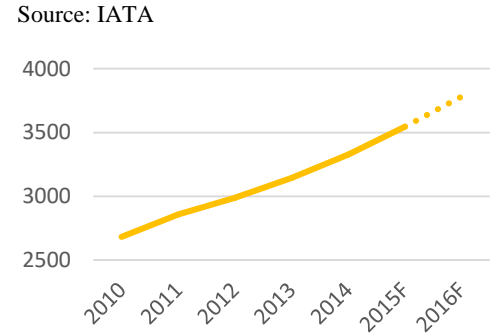


Figure 21: Worldwide Freight Tones (millions)
Source: IATA

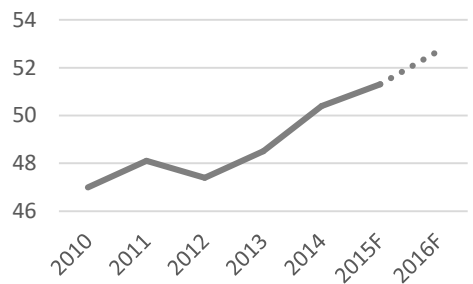
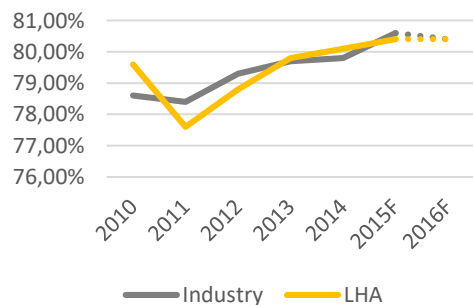


Table 12: Net Profit per Region
Source: IATA

in \$ billion

Region	Net profit
North America	19.4
Europe	6.9
Asia-Pacific	5.8
Middle East	1.4
Latin America	-0.3
Africa	-0.3

Figure 23: Change of PLF
Source: IATA and Company data



Competitors Analysis

We can distinguish two types of competitors, the **Direct Competitors** like Hub Airline Companies and LCC's and the **Indirect Competitors** like the Luxury Airline Companies. In figure 24 we can see the main competitors of LHA, by looking at the share of seats from Europe to all regions. We can see that LHA ranks first with 11% of seats share. Due to their dimension, Easyjet, Air France-KLM, IAG, Ryanair and LHA form the so-called **Europe's Big Five**. In order to study in more detail the competition of LHA, it is essential to look in detail the competition in each region.

Europe is where LHA has the highest traffic share per region (table 13). In this region the airline industry is highly fragmented, the five largest European Airline Groups accounts for less than 50% of total market capacity in terms of domestic European traffic. Hub Airline Companies like Air France-KLM, International Airline Group (IAG) (London) and Turkish Airlines, represent the main competitors together with the LCC's Ryanair and Easyjet that compete directly with Eurowings (figure 25).

North America is the second region with highest Traffic share. Unlike Europe, in this region, the airline industry is consolidated, the five largest North American Airline Groups accounts for 90% of total market capacity. Commercial joint ventures and alliances with United Airlines and Air Canada are vital to ensure a strong presence of LHA in this region. The main competitors to the flow of traffic between Europe and this region are IAG, Delta Air Lines, American Airlines and Air France-KLM (figure 26).

Asia-Pacific, with 17.8% of traffic share, represents an important region to LHA. Commercial joint ventures and alliances with Air China, ANA Group (Japan) and Singapore Airlines, are crucial to maintain the traffic share in this region. The main competitors to the flow of traffic between Europe and this region are Aeroflot (Russia), Air France-KLM and Turkish Airlines (appendix 12).

Latin America accounts for only 5.7% of traffic share. The main competitors to the flow of traffic between Europe and this region are Air France-KLM, IAG, TUI Group and TAP Portugal (appendix 12).

In the **Middle East**, LHA faces great competition from the **Gulf Three** (Emirates, Qatar Airways and Etihad) that focus on traffic between Middle East and Europe, together with the Hub Airline Company Turkish Airlines (appendix 12). Recently, Qatar Airways, bought 20% of IAG shares, taking advantage of the pound sterling devaluation after Britain's exit from European Union (Brexit), in order to expand its presence in Europe. In the long run, Qatar Airways may act as a direct competitor to LHA in Europe.

Africa, due to the economic situation and political conflicts only represents 3.6% of traffic revenue. The main competitors to the flow of traffic between Europe and this region are Air France-KLM, Royal Air Maroc, Air Algerie and Turkish Airlines (appendix 12).

A short resume of LHA competitors can be seen in appendix 13.

Table 13: Traffic share per Region of LHA
Source: LHA Annual report 2015

Region	Traffic share
Europe	44.40%
North America	24.90%
Asia-Pacific	17.80%
Latin America	5.70%
Middle East	3.60%
Africa	3.60%

Figure 24: Share of Seats from Europe to all Regions
Source: CAPA, OAG

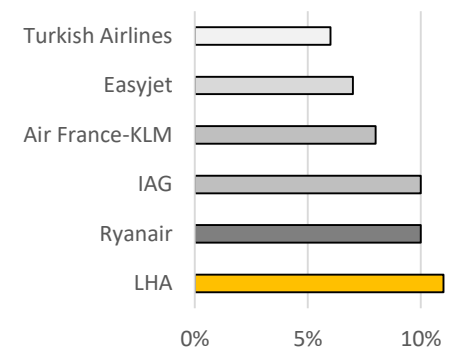


Figure 25: Share of Seats from Europe to Europe
Source: CAPA, OAG

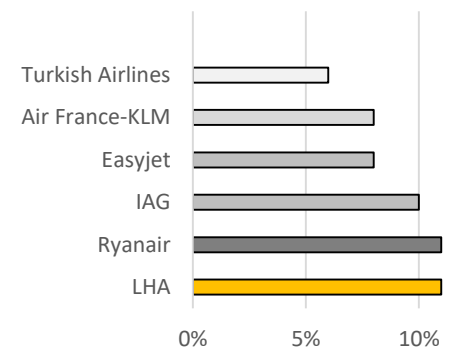
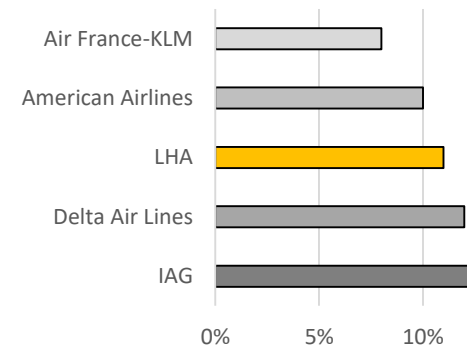
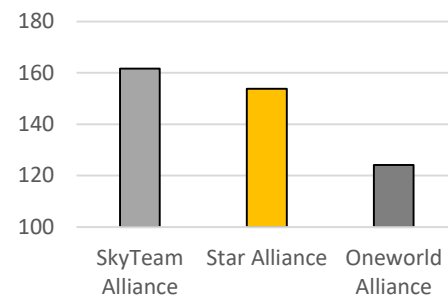


Figure 26: Share of Seats from Europe to North America
Source: CAPA, OAG



Airline Alliances have an important role in the analysis of the competitive market. These alliances bring many benefits to Airline Companies and customers. **Airline Companies**, benefit from an extended route network, share of airport lounges, cost savings, brand recognition and economies of scale, scope and traffic density. **Customers**, benefit from frequent flyer programs, coordinated schedules, seamless travels and lower ticket prices. These benefits can result in an increased market share and a stronger market position that lead to competitive advantages. The three major airline alliances are **Oneworld Alliance**, **Star Alliance** and **SkyTeam Alliance** (figure 27).

Figure 27: Airline Alliances per Revenues (billions)
Source: Oneworld Alliance, Star Alliance and SkyTeam Alliance official page



Competitive Position

Table 14: SWOT Analysis
Source: Author

Strengths	Weaknesses
<ul style="list-style-type: none"> - Globally recognized and reliable brand; - One of the largest route network; - Multiple Hubs in Europe; - Strong commercial joint Ventures, Partnerships and alliances; - Well diversified business profile within the industry. 	<ul style="list-style-type: none"> - One of the highest Cost per available seat kilometer between European Airlines; - Germanwings has a cost base too high for a LCC.
Opportunities	Threats
<ul style="list-style-type: none"> - Investment on LCC's (Eurowings); - Increasing demand for airline industry; - New aircraft technology to reduce costs; - Expansion of oil Production in North America. 	<ul style="list-style-type: none"> - Strikes; - Increase of Fuel Prices; - Exchange rates movements; - Increase of Interest rates; - terrorism; - Competition from LCC's.

Porter's 5 Forces

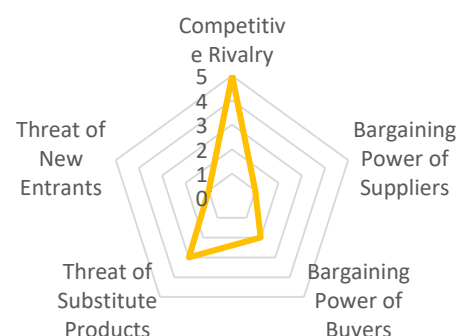
Threat of New Entrants (Low)

The airline companies are largely dependent on bank loans and credit in order to invest in the fleet, the more accessible these loans and credits are for the companies, more easily they enter the market. For example, an Airbus A320 (medium-haul aircraft) costs 97 million dollars and a Boeing 747 (long-haul aircraft) costs 240 million dollars. However, customers tend to choose only companies with a known and reliable brands, making this a lower threat.

Bargaining Power of Suppliers (Low)

The airline industry is mainly dominated by two big airplane manufacturers, Boeing and Airbus. It is unlikely that new manufacturers enter the market due to the high costs. In LHA, Boeing and Airbus makes 80% of the fleet, with the remaining 20% consisted of smaller manufacturers such as Bombardier, Avro, Embraer and Fokker. Because the airline companies are the only income for this manufacturers, makes these companies have a low bargaining power.

Figure 28: Porter's 5 Forces
Source: Author, Company Data



Bargaining Power of Buyers (Medium-Low)

Buyers have a medium-low bargaining power due to the fact that they choose the flight according to their needs and there is no big difference between airplanes in the same segment. Switching cost aren't very high in the same segment, however, when compared in different segments, for example, a luxury airline company with an LCC, switching costs become significant.

Threat of Substitute Products (Moderate)

The threat of substitutes vary according to preference and travel distance. Examples such as car, bus, train or boat, can be another way to travel if the distance, price or time is the most appropriate for the situation. Switching costs are significant when comparing different ways to travel.

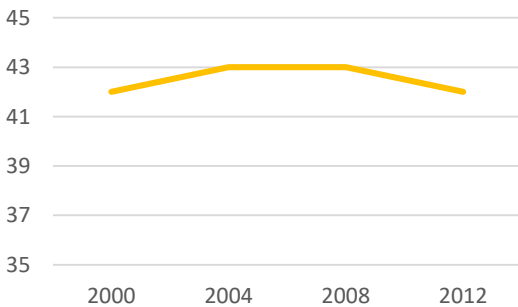
Within Europe, Air Transport is the way that had the largest increase followed by the use of rail transport. In the opposite direction, the use of Passenger Cars and Buses decreased. Maritime Transport remained at a constant level over the years.

The evolution of the main means of transport within Europe can be seen in figures 29 to 33.

Competitive Rivalry (High)

This industry has an intense competition in all segments and between segments, there is always a great number of choices when deciding where to travel, which leads to high costs of competition. This intense competition affects both Hub and low cost airline companies in LHA.

Figure 31: Passenger Transport in Europe by Boat (billions)
Source: Eurostat



Like any other player in the market, LHA has its Strengths, weaknesses, Opportunities and threats. In such a competitive industry as the airline industry, airline companies have to explore their strategies in order to be successful. The LHA management team is focused on continuing to reinforce its strengths by expanding the route network and upgrading the customer experience by renewing the fleet and the cabin layouts; taking advantage of market opportunities by investing in the low cost segment by developing Eurowings; reducing their threats by implementing strong hedging strategies; and to overcoming their weaknesses by trying to increase their margins by implementing a solid financial strategy.

Figure 29: Passenger Transport in Europe by Car (billions)
Source: Eurostat

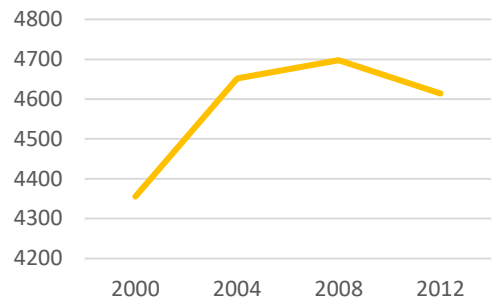


Figure 30: Passenger Transport in Europe by Bus (billions)
Source: Eurostat

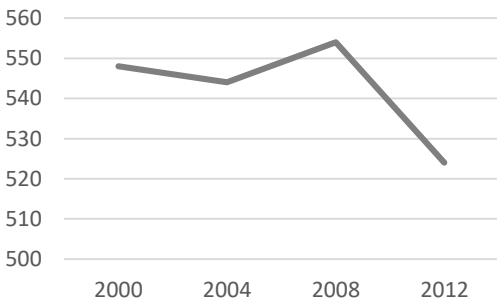


Figure 32: Passenger Transport in Europe by Plane (billions)
Source: Eurostat

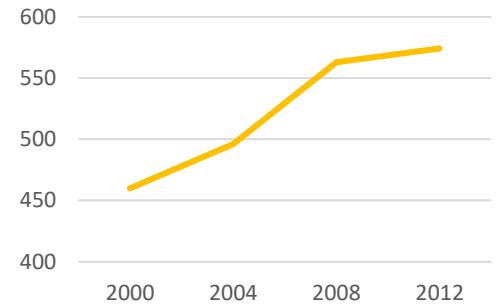
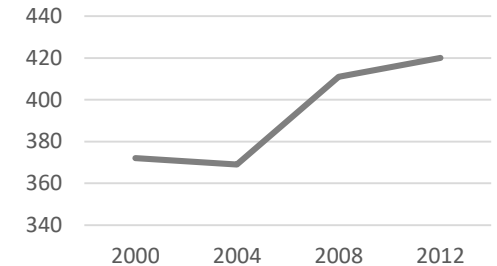


Figure 33: Passenger Transport in Europe by Railway (billions)
Source: Eurostat



5. Investment Summary

With a price target of € 14.43 and an upside level of 37.51% at the end of 2016, using the Discounted Cash Flow Method, our recommendation stands for **BUY**. Relative valuation through Multiples supports our view with an average price target of € 16.60 and an upside potential of 58.26%. Both methods indicates that LHA is currently undervalued (table 15).

Company Valuation

In order to evaluate LHA, we used two different valuation methods, an absolute and a relative valuation model. For the absolute valuation model, we used the **Discounted Cash Flow (DCF)** approach and for the relative valuation model, we used the **Market Multiples** approach.

In both methods, **we evaluated LHA as a Group**, mainly for three reasons: (i) LHA has a vertical structure in which the segments are very dependent and connected on the performance of the passenger airline group; (ii) we predict that the Logistics segment will have negative free cash flows until the end of the valuation period, which makes the valuation model more complex to implement; (iii) although the "Other Segment" represents 0.8% of group revenue, it accounts for almost 20% of EBIT due to the high costs that are supported by other segments, but because of lack of information, we were unable to evaluate at a segment level.

For the forecast period, we predict that **Earnings per Share (EPS)** will increase until the end of 2018, due to higher demand, favorable fuel prices and passenger yields. Later, in 2019, EPS will start to decrease until the end of the valuation period mainly due to the deceleration in revenues driven by the deceleration of German GDP and the rise of costs in general driven by the German inflation rate (figure 34).

Despite the Logistics segment is giving **negative EBIT** until the end of the valuation period (figure 35), we think that LHA must preserve it due to the competitive advantage that this service brings to the company by increasing the range of services available (creating synergies) and to the positive previsions in the long term for this segment.

Company Risks

In this industry, in particular, we have to pay close attention to some **Investment Risks** such as terrorism and accidents that although being impossible to predict, can strongly affect the company due to the possible damage to property and people together with the potential loss of costumers as a result of fear of traveling.

In order to compute the impact of the main investment **Risks to the Price Target**, we computed a sensitivity analysis and a Monte Carlo Simulation (figure 36). According to Monte Carlo simulation, **Aircraft fuel and lubricants (81.93%)** and **Fees and charges (48.40%)** are the main risks to price target. The mean of the price target by this simulation is € 14.37, representing an **Upside Potential** of 36.99%. Which is near the price target computed by the DCF valuation of € 14.43. There is a 54% probability of our **BUY** recommendation being accurate.

Table 16: Effects of change in Perpetuity WACC
Source: Author, Company Data

Change in perpetuity WACC							
14.43 €	5.40%	5.50%	5.60%	5.69%	5.80%	5.90%	6.00%
Price	15.91 €	15.37 €	14.85 €	14.43 €	13.89 €	13.44 €	13.02 €
Change (%)	10.31%	6.53%	2.93%		-3.73%	-6.82%	-9.77%

Table 15: Valuation Summary
Source: Author, Company Data

DCF valuation	
Enterprise Value	11,142.20 €
Target Price	14.43 €
Multiples valuation	
EV/EBITDA Target Price	15.80 €
P/E Target Price	17.40 €
Multiples Average	16.60 €
Difference	
2.18 €	15.09%

Figure 34: LHA's EPS
Source: Author, Company Data

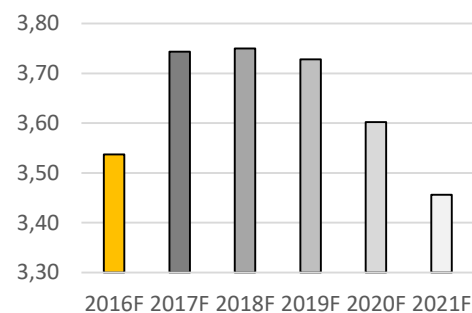


Figure 35: Logistics EBIT
Source: Author, Company Data

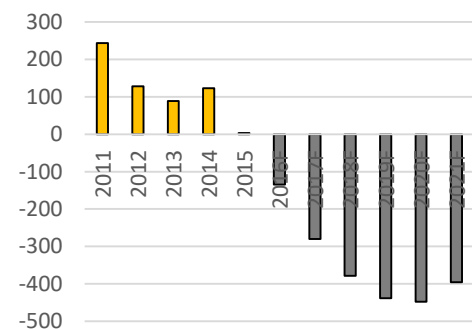
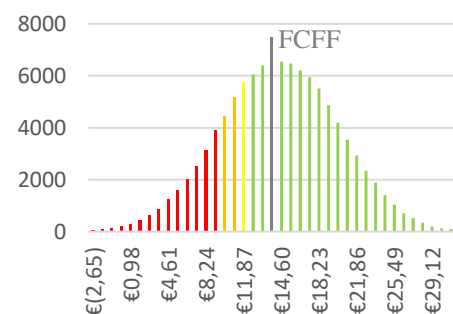


Figure 36: Monte Carlo Price distribution
Source: Author, Oracle crystal ball



6. Valuation

As mentioned before, we used two different valuation methods to evaluate LHA, an absolute and a relative valuation model.

For the absolute valuation model, we used the **Discounted Cash Flow (DCF)** approach. This method is the most appropriate for this company due to the amount of information that we were able to get, which made it possible to reach the enterprise value of the group. The Dividend Discount Model is not suitable since LHA's dividends distribution is uncertain. In order to reach the enterprise value of the company, it was computed the Free Cash Flow to the Firm (FCFF) of the group. The Free cash flow to Equity (FCFE) is not suitable since the company is changing its capital structure.

For the relative valuation model, we used the **Market Multiples** approach. In order to achieve the target price, a **Peer group** was selected from a large sample of airline groups that had to meet a number of criteria that were selected in order to create a group of comparable companies in terms of structure, dimension and risk. For this valuation we used the multiples Enterprise Value to EBITDA (EV/EBITDA) and Price to Earnings (P/E). More details about valuation methods can be seen in appendix 11.

Forecast Analysis

Total Revenue is the sum between Traffic Revenue and Other Revenue (figure 37). We can see that Traffic revenue is the main driver of total revenue due to the great contribution that this type of revenue have in total.

Traffic Revenue is the sum between the passenger airline group and logistics traffic revenue (figure 38).

In the case of **passenger airline group**, we expect an increase until the end of 2017, due to expected favorable passenger yields and fuel prices along with the investment in Eurowings. However, this increase will be slightly lower than the increase in 2015 due to the increased pricing pressure in 2016 caused by greater capacities on the market and intense competition due to lower overall costs for the industry. Afterwards, due to the deceleration of German GDP and the expected increase in fuel prices, we predict a deceleration in growth until the end of 2021.

For the **Logistics** segment, we expect a decrease in growth due to the sharp decrease in the yields, intense competition and weak market and demand. In the long run is expected to stabilize. The result of this combination is an **overall increase** in traffic revenue (figure 39).

Other Revenue is essentially the sum of MRO, Catering and Other segment external revenue together with the PAG and logistics external revenue excluding traffic revenue. In the case of **MRO**, we predict a growth in revenues identical to the expected inflation rate. For the **Catering** segment, we assume a percentage of 8.68% of the passenger airline group revenues, due to the fact that there is a very strong correlation between catering revenues and PAG revenues. For the other segment, we assume a constant value equal to 2015 nominal value until the end of 2021. For the other external revenues excluding traffic revenue of PAG and logistics segment, we assume a growth identical to the expected inflation rate. The result of this combination is an **overall increase** in other revenue (figure 40).

Figure 37: Combination of Total revenue (millions)

Source: Author, Company Data

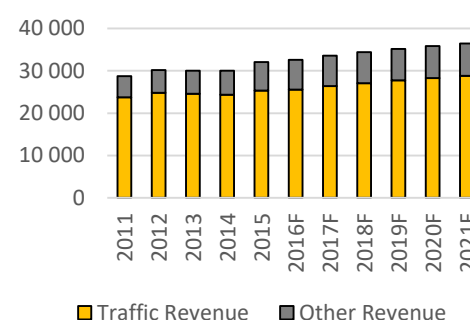


Figure 38: Combination of Traffic revenue (millions)

Source: Author, Company Data

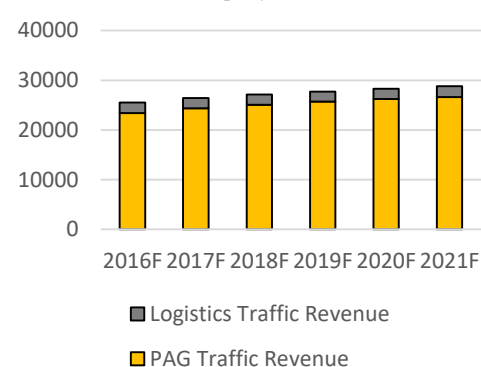


Figure 39: Traffic Revenue (millions)

Source: Author, Company Data

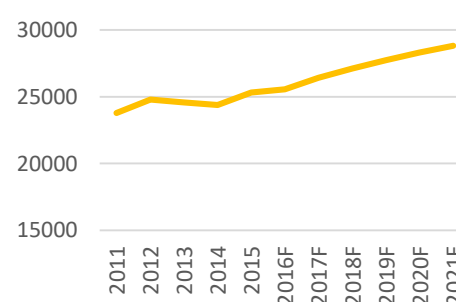
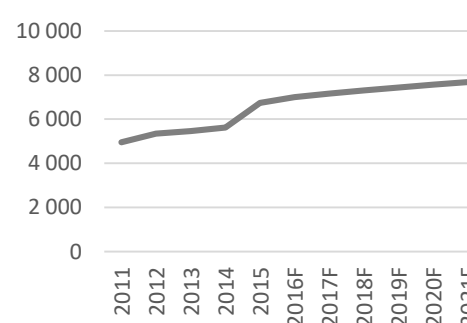


Figure 40: Other Revenue (millions)

Source: Author, Company Data



Cost of materials and services (CMS)

In the last 5 years, CMS accounted for an average of 57.73% of Revenues. This cost is very important because it contains the costs with **Aircraft Fuel** and **Fees and charges**. We predict that CMS will increase (figure 41) mainly due to inflation and increased demand in the medium term. More details about the CMS can be seen in appendix 14.

Staff Cost

Staff is the largest cost in LHA, in the last 5 years accounted for an average of 23.95% of Revenues. We predict that Staff cost will increase (figure 42) mainly due to inflation and to the capacity that unions in Germany have in influencing the government. In recent years, total average wages have been increasing as a consequence of this influence and are expected to continue for the coming years. More details about the Staff cost can be seen in appendix 14.

Debt

We predict the issuance and retirement of debt in function of the Net Cash final balance. For this, we saw the amount of cash from operating and investing activities, along with the interest and dividend paid and the change in net cash in order to compute the amount of debt that LHA needs to issue/retire. With this strategy we are able to reach the target D/E ratio of 1.

Capital Expenditure (Capex)

The fleet strategy aims to continuously reduce the number of aircraft types in operation and to maintain a large unencumbered fleet. LHA expects to invest in the fleet, by replacing older aircraft with new ones in order to increase the seat capacity without increasing the total size of the fleet. Thanks to this investment together with the costs from the renewal program of cabin layouts and Eurowings expansion, we expect a large increase in the Capital expenditures in the short run, and then, in the medium term, to stabilize to values around 3000 million (figure 43). More details about Capex can be seen in appendix 14.

Depreciation and amortization (D&A)

Due to the fleet strategy and the renewal program of the cabin layouts, the Aircraft and reserve engines will increase in value due to the new models that are expensive because of the new layout and technology, so it is logical that the D&A will also increase (figure 44). More details about D&A can be seen in appendix 14.

Net Working Capital (NWC)

Since we predict that current liabilities will be higher than current assets, we predict a negative variation of NWC (table 17). This could be explain by the increase in Payables due to the investment in the new fleet and Eurowings, which requires more payment to suppliers. For each segment, we assume the percentage of the business share in group revenue.

Table 17: Net Working Capital
Source: Author, Company Data

in €m

Years	2015	2016F	2017F	2018F	2019F	2020F	2021F
Total Δcurrent assets	-413.0	-14.9	-167.9	-139.8	-126.5	-114.8	-102.2
Total Δcurrent liabilities	537.0	102.1	128.0	106.6	96.5	87.6	78.0
Total ΔNWC	124.0	87.2	-39.8	-33.2	-30.0	-27.2	-24.2

Figure 41: Cost of materials and services (millions)

Source: Author, Company Data

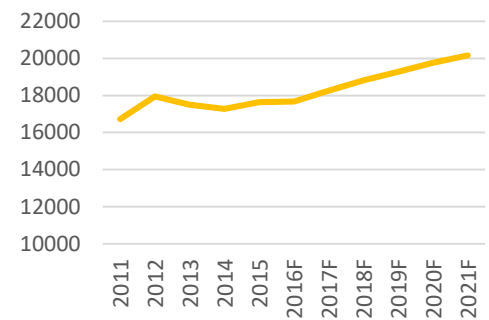


Figure 42: Staff Cost (millions)

Source: Author, Company Data

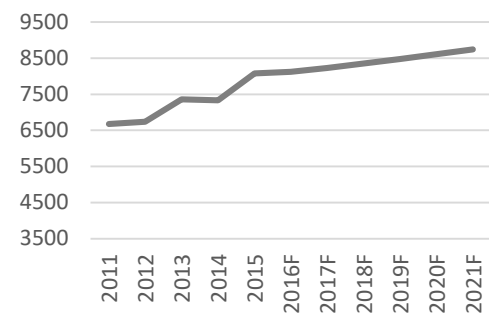


Figure 43: Capex (millions)

Source: Author, Company Data

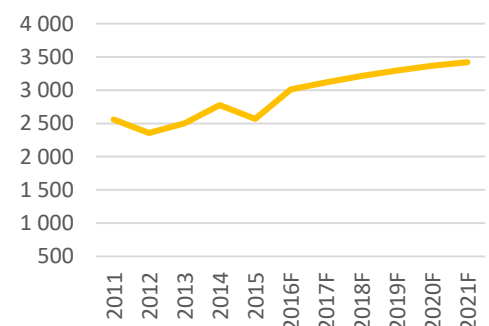
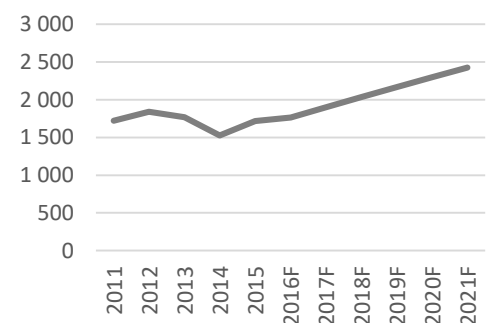


Figure 44: D&A (millions)

Source: Author, Company Data



DCF Valuation

The result of the DCF valuation was a **target price** of € 14.43 for the end of 2016 (table 18), representing an **upside potential** of 37.51%. In our perspective, LHA is currently **undervalued**, so, our recommendation, based on the DCF valuation, is to **BUY**. More details about the DCF Valuation can be seen in appendix 15.

As mentioned before, the DCF valuation was computed as a group. In order to acquire the consolidated EBIT, we estimated the income statement per segment to reach the consolidated income statement after the appropriate adjustments (table 19). More details about the income statement per segment can be seen in appendix 3.

Table 19: EBIT per segment
Source: Author, Company Data
in €m

Year	2015	2016F	2017F	2018F	2019F	2020F	2021F
PAG	1,465	1,526	1,747	1,779	1,788	1,669	1,513
Logistics	3	-135	-280	-379	-438	-448	-395
MRO	448	893	834	782	743	702	673
Catering	85	151	168	167	162	146	125
Other	-383	-18	-31	-44	-57	-70	-82

Although the logistics segment is giving **negative EBIT** by the end of the valuation period, we think that LHA must preserve it, due to the recognition that Lufthansa Cargo brings to the group for being the Europe's leading freight airlines; for the significant competitive advantage that this service brings to the company by providing this service (creating synergies), and to the positive provisions in the long term for this segment.

We predict the **Future Cash Flows** to be positive by the end of the forecast period. From 2016 until 2019, we can see an increase in the future cash flows, then, in 2020, they start to decrease until the end of the valuation period (table 20).

Table 20: FCFF
Source: Author, Company Data
in €m

Years	2016F	2017F	2018F	2019F	2020F	2021F
EBIT (1- Corporate tax rate)	1,527.2	1,623.0	1,598.6	1,582.5	1,499.3	1,429.9
D&A	1,764.9	1,900.3	2,034.9	2,167.7	2,297.8	2,424.1
Net increase in NWC	87,2	-39,8	-33,2	-30,0	-27,2	-24,2
Capex	3,009.2	3,115.4	3,211.5	3,295.6	3,366.1	3,421.6
FCFF	195.7	447.7	455.1	484.6	458.3	456.7

The formula used to compute FCFF is the following:

$$FCFF = EBIT * (1 - \text{Marginal tax rate}) + D\&A - \text{Net increase in NWC} - \text{Capex}$$

Table 18: DCF output
Source: Author, Company Data
in €m

DCF Output	
Enterprise Value	11,142.20
Net debt	4,417.90
Value of equity	6,724.29
# shares outstanding	466.15
Price at the end of 2016	14.43 €
Current price	10.49 €

DCF Assumptions

The **Valuation Period** considered was 6 years. This period went from December 31, 2015 until December 31, 2021. After this period, the Terminal Value is then added.

The **Discount Rate** applied to the future cash-flows is the one that results from the LHA's **Weighted Average Cost of Capital (WACC)**. This rate has different values every year due to changes in the company's capital structure. The WACC rate was estimated using the following formula:

$$WACC = ke * [E(E+D)] + kd * [D(E+D)] * (1-T)$$

The WACC rate computed for 2016 is 5.0% (table 21), near the currently WACC rate estimated by LHA of 4.8%. If we check the WACC rate using Aswath Damodaran's calculations, we reach a value of 5.04%, near the value that we estimated for 2016.

The **Cost of Equity (ke)**, is the rate of return that stakeholders require for a company. For 2016, we predict a cost of capital of 8.93%. It was calculated using the **Capital Asset Pricing Model (CAPM)**. We do not include the Country Risk Premium because it is null for Germany. The formula used is the following:

$$ke = Rf + \beta * MRP$$

For the **Risk Free Rate (Rf)**, we computed the average of the past 5 year Euro zone 10 year AAA government bonds, we reach a value of about 1.20%.

In order to reach the **Beta levered (β)**, first, we saw the unlevered Beta of the industry using the Aswath Damodaran's calculations as in January 5, 2016 of 0.61, then, we used the formula below in order to reach the beta levered of 1.24.

$$\beta_L = \beta_u * [1 + D/E*(1-T)]$$

For the **Market Risk Premium (MRP)**, we used the Aswath Damodaran's calculations as in February 11, 2016 of 6.25%. For the **Country Risk Premium (CRP)**, we used the same Aswath Damodaran's calculations, reaching a value of 0.00%.

The **Cost of Debt (kd)**, is the effective rate that a company pays on its Debt. This rate has different values every year due to changes in the company's Debt structure. We reached the cost of debt by dividing **total interest expenses** by **total Debt**. If we check the cost of debt using Aswath Damodaran's calculations, we reach a value of 2.45%, slightly less than the value that we computed of 2.79% for 2016.

For the **Tax Rate (T)**, we considered 15% for corporation tax plus 10% for trade tax and solidarity surcharge, according to German Law. Combined we reach a total tax rate of 25%.

For The **Terminal Value (TV)**, we follow the **Perpetuity Growth Model** approach.

We computed assuming a **Perpetuity WACC** equal to the 2021 WACC rate of 5.7%, and a **Perpetual Growth Rate (g)** of 1.7%, slightly less than the previous years, in order to be more realistic for the terminal value and in line with the German inflation rate. The formula used is the following:

$$TV = [FCFF * (1 + g)] / [(WACC - g)]$$

Table 21: WACC

Source: Author, Company Data, Damodaran

2016F	
Risk free rate (RFR)	1.20%
Country risk premium (CRP)	0.00%
Market risk premium (MRP)	6.25%
Beta levered	1.24
Cost of equity (ke)	8.93%
Cost of debt (kd)	2.79%
Marginal tax rate	25.00%
After-tax cost of debt	2.09%
Weight of equity	42.3%
Weight of debt	57.7%
WACC	5.0%

Multiples Valuation

In order to acquire the target price by the multiples valuation, we used the multiples Enterprise Value/EBITDA (EV/EBITDA) and Price/Earnings (P/E).

For the **EV/EBITDA**, we reached a target price of € 15.80 for the end of 2016, representing an upside potential of 50.63% (table 22).

For the **P/E**, we reached a target price of € 17.40 for the end of 2016, representing an upside potential of 65.89% (table 23).

These results solidifies the results achieved by the DCF Valuation and support our perspective that LHA is currently **undervalued**. If we consider the two multiples, we reach an average of 58.26% **upside potential**, representing a difference of 15.09% compared to DCF valuation (table 24). Our recommendation remains to **BUY**.

Despite the useful information that we get by the multiples valuation, we consider that the DCF valuation provides a better estimation of LHA intrinsic value, being the multiples valuation a complement valuation.

Table 24: Multiples Output
Source: Author, Company Data

Multiple Average	16.60 €
DCF	14.43 €
Difference	15.09 %

Multiples Assumptions

After the proper tests (appendix 16), we conclude that our peer group is consisted of 4 companies, which represents half of the initial sample. They are:

Air France-KLM (France), **IAG** (UK), **American Airlines Group** (USA), and **Delta Air Lines** (USA) (table 25).

This peer group was used to compute the average forecast EV/EBITDA and P/E for 2016, in order to compute the price target using the **forward valuation** for multiples (table 26). Forward multiples are not normalized because all peers are integrated and operating worldwide.

We can see that the average forecast EV/EBITDA for 2016 is 3.10 and the average forecast P/E is 4.92. The Peers strategy can be find in appendix 17.

Table 26: 2016 Peer group output
Source: Reuters

Peers Multiples 2016				
Peers	EV/EBITDA	P/E	EBITDA Growth	Earnings Growth
IAG	2.60	4.80	40.20%	22.80%
Air France-KLM	2.20	3.00	16.39%	29.00%
American Airlines	4.60	5.60	-28.30%	16.40%
Delta Air lines	3.20	6.00	-0.90%	18.30%
Median	2.90	5.20	7.75%	20.55%
Mean	3.10	4.92	7.03%	21.41%

Table 22: EV/EBITDA Output
Source: Author, Reuters

Comparable Price Target Valuation	
EV/EBITDA	2016F
LHA EBITDA	3,801
Average Peers EV/EBITDA	3.10
LHA EV by Peers estimate	11,783.74
LHA Net Debt	4,417.90
LHA Equity by Peers estimate	7,365.841
Shares outstanding	466.15
Price Target	15.80 €
Current Price	10.49 €

Table 23: P/E Output
Source: Author, Reuters

Comparable Price Target Valuation	
P/E	2016F
LHA EPS	3.54
Average Peers P/E	4.92
Price Target	17.40 €
Current Price	10.49 €

Table 25: Peer selection output
Source: Author

Airline Group	Peer?
Air France-KLM	Yes
IAG	Yes
Turkish Airlines	No
Aeroflot	No
EasyJet	No
Ryanair	No
American Airlines	Yes
Delta Air Lines	Yes

7. Financial Analysis

In 2012, **EBIT Margin** increased compared to 2011 and then, in 2013, declined again. In 2014, it began to increase until the end of 2017, mainly due to increased demand, favorable passenger yields and fuel prices. After 2017, we expect a decrease until the end of the valuation period, mainly due to the increase in costs in general and the deceleration of revenues driven by the slowdown in German GDP (figure 45).

LHA's Equity began to increase in 2014 until the end of the valuation period. In 2020, total equity almost equaled total Debt, and in 2021, turned out to overcome it. In the final of 2021, total equity is 50.3% and total debt is 49.7% (figure 46), near the **Target Capital Structure** of 50% - 50%. The reason for the large increase of equity was due to the good performance of the company which allowed the retention of earnings, increasing the total shareholders' equity.

Equity Ratio decreased from 2011 to 2014, reaching a low of 13.23%, then, it began to increase until the end of the valuation period, reaching a total of 29.20% (figure 47), higher than the target of 25% that LHA had in the medium term. This indicates a stable capital structure, which is the goal of LHA. The reason behind the equity ratio growth was once again the increase of total shareholders' equity.

From 2016 until the end of the valuation period, LHA ensures adequate **Liquidity** for having a level of liquidity above the minimum established by the group of 2300 million (figure 48). This enables liquidity and refinancing risks to be reduced.

Dividend policy has been uncertain since 2011. In 2012 and 2014, LHA has not paid any dividends, they only did it in 2011, 2013 and 2015 with a dividend payout ratio of 13.2%, 22.1% and 13.9% respectively. After 2015, we assume a constant dividend payout ratio of 25% due to the good performance of LHA in general, within the target of a regular dividend of 10% to 25% of EBIT.

Passenger Airline Group segment, continues to be the principal driver of group revenue. Until the end of 2021, it will increase its influence in the group, reaching a total of 76.55% share of group revenue. On the other hand, Logistics, MRO, Catering and other segments will slightly reduce its share until the end of the valuation period (table 27).

Table 27: Segments share of group revenue
Source: Author, Company Data

Year	2015	2016F	2017F	2018F	2019F	2020F	2021F
PAG	74.30%	75.62%	76.18%	76.50%	76.69%	76.71%	76.55%
Logistics	7.30%	6.78%	6.35%	6.11%	5.98%	6.01%	6.20%
MRO	10.20%	10.06%	9.90%	9.83%	9.78%	9.75%	9.75%
Catering	7.40%	6.74%	6.78%	6.80%	6.81%	6.80%	6.78%
Other	0.80%	0.80%	0.78%	0.76%	0.74%	0.73%	0.72%

Figure 45: EBIT Margin
Source: Author, Company

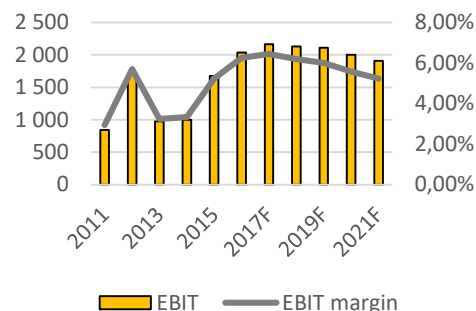


Figure 46: LHA's Structure
Source: Author, Company Data

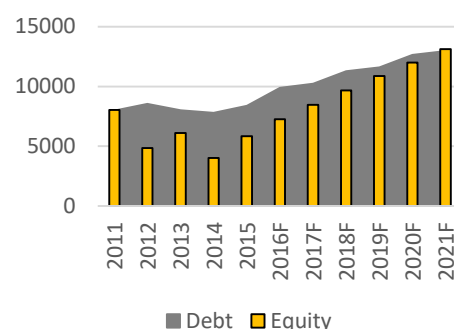


Figure 47: LHA's Equity Ratio
Source: Author, Company Data

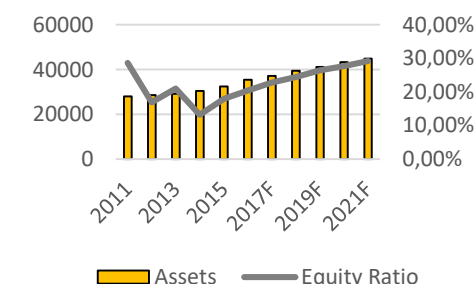
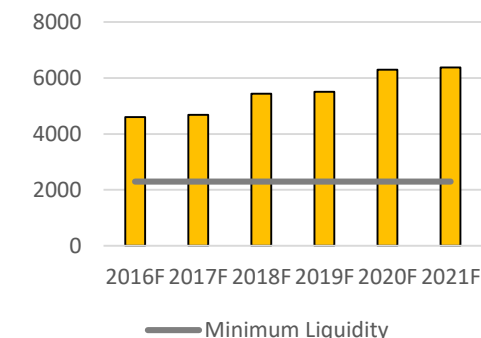
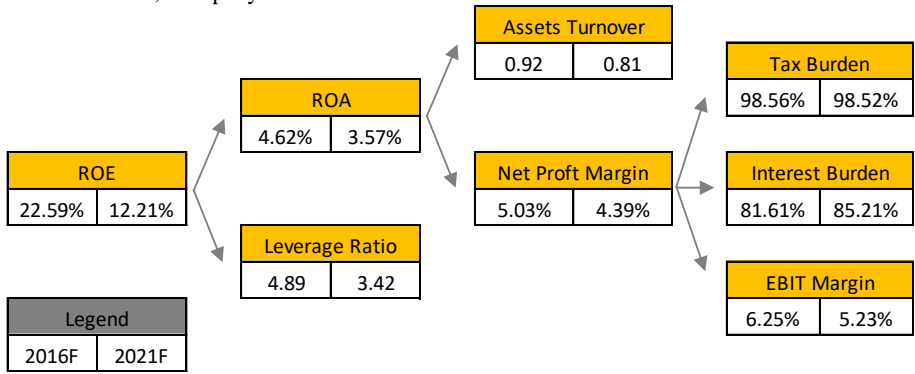


Figure 48: LHA's Liquidity (millions)
Source: Author, Company Data



Return on Equity (ROE), experienced a sharp decrease between 2012 and 2015 due to lower profits in 2013 and 2014. In 2015 reached its highest value. Then, began to slowly decrease until the end of the valuation period mainly due to the decrease in ROA, Leverage Ratio and Assets turnover (figure 49 and 50). This lower ROE is compensated with a higher dividend payout ratio for the equity investors. More details about ROE can be find in appendix 18.

Figure 50: Projected ROE
Source: Author, Company Data



From 2012 until 2015, the **Gross Profit Margin** had a large increase mainly due to the sharp decline of fuel prices. Since the fuel prices are expected to increase in the medium term together with the German inflation rate, we predict a slow decrease in the gross profit margin until the end of the valuation period (figure 51). This ratio is very important to analyze in the airline industry in order to understand how the airline companies manage two of the main costs of this industry (Fuel and Fees and charges).

Figure 49: ROE
Source: Author, Company Data

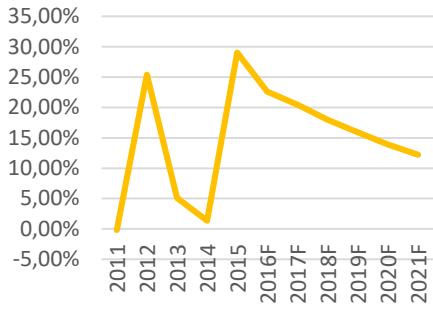


Figure 51: Gross Profit Margin
Source: Author, Company Data

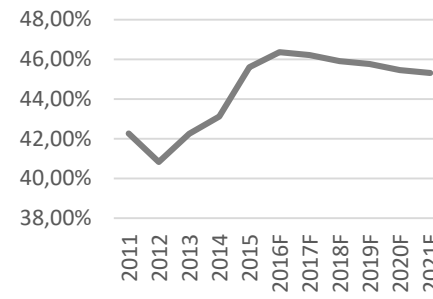


Figure 52: Historical Share Price
Source: Reuters, LHA Official Website



8. Investment Risks

Figure 53: Risk Matrix
Source: Author

Safety Risk | Terrorism (SR1)

Terrorism is a threat that, although it is impossible to predict, it might exert a high impact on the airline industry. These criminal acts have been increasing due to the rise of terrorist organizations (e.g., Islamic State of Iraq and Syria (ISIS)). A terrorist attack in a Lufthansa flight would spread a huge cost to the company because it can represent a damage to property and people. It can also represent a potential loss of customers as a result of fear of traveling. In the history of airline industry, less than 5% of the accidents were terrorist acts, sabotage or hijackings (figure 54), which suggests that the probability of an accident due to a terrorist attack is low.

Safety Risk | Accidents (SR2)

Accidents can occur due to diverse factors: **environmental factors** such as weather, **technical factors** such as mechanical failures, **organizational factors** such as staff selecting and **human factors** such as human errors. In 2015 there were 121 accidents worldwide (figure 55), among them, was the crash of a Germanwings plane on 24 March 2015, the only accident of LHA in 2015. Before that, the last accident of LHA was in 1993. If we consider that on average, there are about 100,000 flights per day in the world, we reach the conclusion that the probability of an accident is extremely low but with a significant impact due to the possibility of damage to property and people.

Market & Economic Risk | Interest Rate Risk (MER1)

An increase in interest rates could lead to a considerable impact on the company accounts due to the amount of credit and bank loans that the company needs, especially to invest in the fleet. The fact that the debt to equity ratio of LHA is expected to decrease together with the hedging policy, makes this a risk without a big probability of occurrence.

Market & Economic Risk | Exchange Rate Movements (MER2)

Since LHA has international operations such as international ticket sales and fuel purchase, it means that it is exposed to the risk of unfavorable exchange rates. These exchange rates have a considerable impact on the company accounts. However, this risk has not a big probability of occurrence due to LHA hedging policy.

Market & Economic Risk | Credit Risk (MER3)

All completed transactions in the course of financial management can lead to default risks. The counterparty default risk is monitored using a system that determines the maximum acceptable risk for each counterparty, making this a risk with a low probability of occurrence, but with a significant impact.

Market & Economic Risk | Fuel Price Risk (MER4)

Airline companies are very sensitive to Fuel price, a large increase in fuel prices could lead to a great impact in terms of costs for the company. However, this risk has not a big probability of occurrence due to LHA hedging policy.

Regulatory & Legal Risk | Emission Trading System (RL1)

There is an emission trading scheme in the European Union that discriminates against hub airlines with hubs in the EU, putting them at disadvantage with the non-European competitors. There is a risk that the anti-competitive effect of emissions trading for European hub airlines become entrenched, if the ICAO meeting does not pass a resolution.

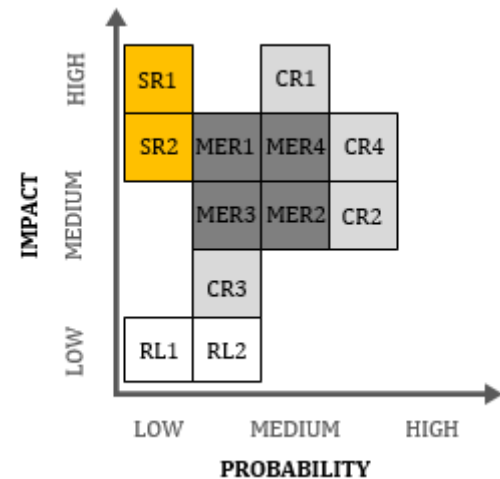


Figure 54: Percentage of Terrorist Acts
Source: ACRO

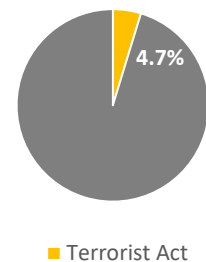
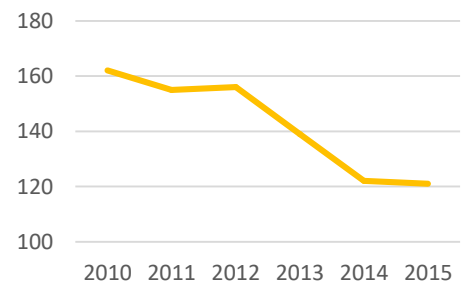


Figure 55: Number of accidents per year
Source: ACRO



Regulatory & Legal Risk | Noise Legislation (RL2)

Noise legislation can affect LHA via higher fees and charges, in the past recent years, this legislation affected the company via financial expenses at Frankfurt Airport and with the introduction of the night-flight ban. There is a risk, through the new ICAO noise limits, that the noise legislation becomes tighter, resulting in additional financial expenses for the company.

Corporate Risk | Strikes (CR1)

Strikes can affect the company during the strike itself and in future bookings, making this, a threat with a big impact. In 2015, LHA had a total cost of 231 million with strikes by the Vereinigung Cockpit pilots' union (VC) and the Independent flight attendants' union (UFO), which affected around 1.1 million passengers and cancelled a total of 8,125 flights. The threat of more strikes can affect the way that passengers book their flights leading to potential loss of customers. Nevertheless, this is a risk to other companies too (competitors), thus LHA may well benefit from strikes in other companies.

Corporate Risk | Loss of the investment grade rating (CR2)

A good rating is what provides access to hedging instruments and new financing. LHA rating grade is under a significant threat due to the high provisions for pensions as a result of the very low discount rates by long term standards. The failure of cash flows to materialize or the erosion of profits can also be a threat to the investment grade rating.

Corporate Risk | Changes in the structure of joint ventures (CR3)

Commercial joint ventures and alliances are vital to ensure a strong presence in different regions and to achieve a higher market share. For LHA, Joint Ventures and Alliances with United Airlines, Air Canada, Air China, ANA Group and Singapore Airlines are vital to ensure a strong presence in North America, and Asia-Pacific. Although, the many advantages of these joint ventures, there is always the risk of these agreements come to an end, weakening the company in relation to competitors.

Corporate Risk | Competition from LCC's (CR4)

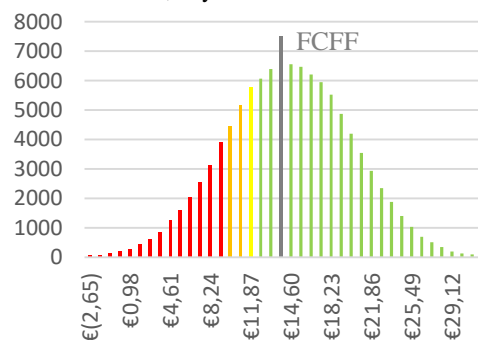
The preference of a large part of consumers for competitive prices over some comfort, especially in emerging economies, makes the LCC's a big threat to the HUB airline Companies. The 25% air share and the strong growth of airline companies like Easyjet and Ryanair are the evidence of this threat. The threat of such companies gain more air share on the hub airlines, can result in a great loss for this segment. However, this threat can also be seen as an opportunity. With the development of Eurowings, LHA is trying to overcome this threat and turn into an opportunity for the group.

Risks to price Target

In order to compute the impact of the main investment risks to the price target, we computed a sensitivity analysis and a Monte Carlo Simulation (figure 56). These risks are essential to the valuation and some differ from the investment risks mentioned before.

We focused on studying the impact of the main costs of an airline company and the impact of change in some variables of the WACC rate, like the country risk premium, market risk premium, terminal growth, among others.

Figure 56: MC Price distribution
Source: Author, Crystal ball software



Monte Carlo

For the Monte Carlo simulation, we used the Crystal Ball Software, covering a total of 100,000 trials. We focused on testing the 3 main costs of an airlines company (Fuel, Staff, Fees and charges) and the terminal growth rate which we believe have a major impact on LHA price target. The summary of the Monte Carlo assumptions can be seen in appendix 20.

The mean of the price target by the Monte Carlo simulation is € 14.37, representing an **Upside Potential** of 36.99% (table 28), which is near the price target computed by the DCF valuation of € 14.43.

According to the Monte Carlo, **Aircraft Fuel and lubricants (81.93%)** and **Fees and charges (48.40%)**, are the variables that have a major impact on LHA price target. Staff cost and terminal growth rate have an impact of 19.02% and 12.79% respectively (figure 57). There is a 54% probability of our **BUY** recommendation being accurate.

Sensitivity Analysis

For the sensitivity analysis we also tested for the 3 main costs of an airline company (Fuel, Staff, Fees and charges), and for some WACC variables such as country risk premium, market risk premium and terminal growth rate.

In table 29, we can see that changes in Staff Cost and Aircraft fuel consumption led to a great impact in the target price due to the large impact that these variables have on enterprise value. In addition, in table 30, we can see that changes in WACC variables such as CRP and terminal growth rate, also led to a big impact in the target price due to the great impact that these variables have on WACC rate and terminal value. More details about sensitivity analysis can be seen in appendix 20.

Table 28: Monte Carlo statistics
Source: Author, Crystal ball software

Monte Carlo Statistics	
No. of trials	100,000
Mean	14.37 €
Standard deviation	5.52 €
10th percentile	7.29 €
90th percentile	21.46 €
Upside Potential	36.99%

Figure 57: Monte Carlo sensitivity price distribution
Source: Author, Crystal ball software

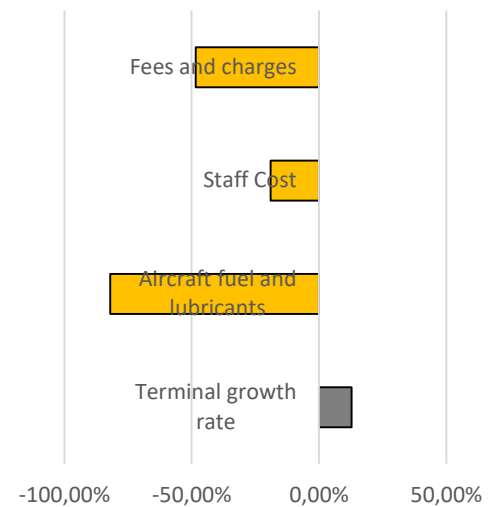


Table 29: Effects of change in staff cost and percentage of aircraft fuel
Source: Author, Company Data

Change in Aircraft fuel	Change in percentage of Staff cost											
	14.43 €	22.34%	22.44%	22.54%	22.64%	22.74%	22.84%	22.94%	23.04%	23.14%	23.24%	23.34%
1.40%	19.63 €	18.72 €	17.81 €	16.90 €	15.99 €	15.08 €	14.16 €	13.24 €	12.32 €	11.39 €	10.46 €	
1.50%	19.41 €	18.51 €	17.60 €	16.69 €	15.78 €	14.86 €	13.94 €	13.02 €	12.10 €	11.17 €	10.24 €	
1.60%	19.20 €	18.29 €	17.38 €	16.47 €	15.56 €	14.64 €	13.72 €	12.80 €	11.88 €	10.95 €	10.02 €	
1.70%	18.98 €	18.08 €	17.17 €	16.26 €	15.34 €	14.43 €	13.51 €	12.58 €	11.66 €	10.73 €	9.80 €	
1.80%	18.77 €	17.86 €	16.95 €	16.04 €	15.12 €	14.21 €	13.29 €	12.36 €	11.44 €	10.51 €	9.58 €	
1.90%	18.55 €	17.65 €	16.74 €	15.82 €	14.91 €	13.99 €	13.07 €	12.15 €	11.22 €	10.29 €	9.36 €	
2.00%	18.34 €	17.43 €	16.52 €	15.61 €	14.69 €	13.77 €	12.85 €	11.93 €	11.00 €	10.07 €	9.14 €	

Table 30: Effects of change in Country risk premium and terminal growth rate
Source: Author, Company Data

Change in CRP	Change in Terminal growth rate											
	14.43 €	1.45%	1.50%	1.55%	1.60%	1.65%	1.70%	1.75%	1.80%	1.85%	1.90%	1.95%
0.00%	13.24 €	13.47 €	13.70 €	13.94 €	14.18 €	14.43 €	14.68 €	14.94 €	15.21 €	15.48 €	15.77 €	
0.50%	12.22 €	12.42 €	12.63 €	12.84 €	13.05 €	13.27 €	13.50 €	13.73 €	13.97 €	14.21 €	14.46 €	
1.00%	11.31 €	11.49 €	11.67 €	11.86 €	12.05 €	12.25 €	12.45 €	12.66 €	12.87 €	13.08 €	13.30 €	
1.50%	10.48 €	10.65 €	10.81 €	10.98 €	11.16 €	11.33 €	11.51 €	11.70 €	11.89 €	12.08 €	12.28 €	
2.00%	9.74 €	9.89 €	10.04 €	10.19 €	10.35 €	10.51 €	10.67 €	10.84 €	11.01 €	11.18 €	11.36 €	
2.50%	9.06 €	9.19 €	9.33 €	9.47 €	9.62 €	9.76 €	9.91 €	10.06 €	10.21 €	10.37 €	10.53 €	
3.00%	8.44 €	8.56 €	8.69 €	8.82 €	8.95 €	9.08 €	9.22 €	9.36 €	9.50 €	9.64 €	9.78 €	

Appendices

Appendix 1: Income Statement

in €m

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F	
Traffic revenue	23,779	24,793	24,568	24,388	25,322	25,551	26,412	27,111	27,738	28,303	28,801	
Other revenue	4,955	5,342	5,459	5,623	6,734	7,007	7,156	7,299	7,434	7,560	7,677	
Total Revenue	28,734	30,135	30,027	30,011	32,056	32,558	33,568	34,410	35,171	35,863	36,478	
Changes in inventories and work performed by entity and capitalized	139	113	158	212	203	203	203	203	203	203	203	
Other operating income	2,324	2,785	2,043	1,890	2,832	2,849	2,892	2,941	2,991	3,042	3,093	
Cost of materials and services	-16,731	-17,946	-17,498	-17,283	-17,640	-17,669	-18,258	-18,815	-19,281	-19,765	-20,155	
Staff cost	-6,678	-6,741	-7,356	-7,335	-8,075	-8,118	-8,227	-8,352	-8,479	-8,609	-8,740	
Depreciation, amortization and impairment	-1,722	-1,839	-1,767	-1,528	-1,715	-1,765	-1,900	-2,035	-2,168	-2,298	-2,424	
Other operating expenses	-5,293	-4,885	-4,756	-5,088	-6,106	-6,143	-6,235	-6,341	-6,449	-6,558	-6,670	
Profit/loss from operating activities	773	1,622	851	879	1,555	1,915	2,043	2,011	1,989	1,878	1,786	
Result of equity investments accounted for using the equity method	-20	31	91	77	111	111	111	111	111	111	111	
Result of other equity investments	91	63	33	44	10	10	10	10	10	10	10	
EBIT	844	1,716	975	1,000	1,676	2,036	2,164	2,132	2,110	1,999	1,907	
Interest income	190	168	162	159	186	206	216	229	238	252	260	
Interest Expenses and other similar expenses	-294	-321	-311	-243	-164	-275	-324	-336	-369	-380	-414	
Other non-operating interest expense	-184	-219	-197	-172	-192	-274	-243	-218	-194	-173	-154	
Other financial items	-110	-48	-83	-564	520	523	531	540	549	559	568	
Profit/loss before income taxes	446	1,296	546	180	2,026	2,216	2,343	2,348	2,334	2,256	2,166	
Profit/loss from discontinued operations	-285	36	0	0	0	0	0	0	0	0	0	
Income taxes	-157	-91	-220	-105	-304	-554	-586	-587	-583	-564	-542	
Profit/loss after income taxes	4	1,241	326	75	1,722	1,662	1,758	1,761	1,750	1,692	1,625	
Profit/loss attributable to minority interests	-17	-13	-13	-20	-24	-24	-24	-24	-24	-24	-24	
Net profit/loss attributable to shareholders of Deutsche Lufthansa AG	-13	1,228	313	55	1,698	1,638	1,734	1,737	1,726	1,668	1,601	
Weighted average number of shares	458	458	460	461	463	463	463	463	463	463	463	
Basis/diluted earnings per share in €	-0.03	2.68	0.68	0.12	3.67	3.54	3.74	3.75	3.73	3.60	3.46	
Dividend Paid						233	509	541	533	528	500	477
Dividend Payout Ratio	13.2%	0.0%	22.1%	0.0%	13.9%	25%	25%	25%	25%	25%	25%	

Appendix 2: Statement of Financial Position

in €m

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Non-Current Assets											
Intangible Assets with an indefinite useful life including goodwill and other intangible assets	1,575	1,568	1,569	1,587	1,657	1,768	1,879	1,990	2,101	2,212	2,323
Aircraft and reserve engines	11,592	11,838	12,359	13,572	14,591	15,685	16,783	17,874	18,947	19,989	20,988
Repairable spare parts for aircraft	840	899	959	1,083	1,388	1,388	1,388	1,388	1,388	1,388	1,388
Property, plant and other equipment	2,118	2,081	2,059	2,109	2,173	2,317	2,447	2,566	2,674	2,771	2,860
Long Term Investments	1,426	832	961	1,231	736	857	978	1,099	1,220	1,341	1,462
Loans and receivables	616	464	500	515	516	516	516	516	516	516	516
Derivative financial instruments	343	268	335	599	1,234	1,234	1,234	1,234	1,234	1,234	1,234
Deferred charges and prepaid expenses	24	25	16	11	12	12	12	12	12	12	12
Effective Income tax receivables	60	52	39	31	19	19	19	19	19	19	19
Deferred tax assets	33	755	622	1,489	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Total Non-Current Assets	18,627	18,782	19,419	22,227	23,526	24,996	26,457	27,898	29,310	30,682	32,002
Current Assets											
Inventories	620	639	641	700	761	723	745	764	781	796	810
Trade receivables and other receivables	3,437	3,595	3,600	3,995	4,389	4,395	4,532	4,645	4,748	4,841	4,925
Derivative financial instruments	414	215	460	456	440	440	440	440	440	440	440
Deferred charges and prepaid expenses	171	151	147	147	158	176	181	186	190	194	197
Effective income tax receivables	128	101	72	122	85	114	117	120	123	126	128
Securities	3,111	3,530	3,146	1,785	1,994	1,994	1,994	1,994	1,994	1,994	1,994
Cash and Cash Equivalents	887	1,436	1,552	953	1,099	2,605	2,685	3,441	3,517	4,304	4,377
Assets held for sale	686	110	71	89	10	10	10	10	10	10	10
Total Current Assets	9,454	9,777	9,689	8,247	8,936	10,456	10,705	11,600	11,803	12,704	12,880
Total Assets	28,081	28,559	29,108	30,474	32,462	35,453	37,162	39,499	41,113	43,386	44,882
Shareholders' Equity											
Issued Capital	1,172	1,177	1,180	1,185	1,189	1,189	1,189	1,189	1,189	1,189	1,189
Capital reserve	1,366	1,382	886	170	187	187	187	187	187	187	187
Retained earnings	3,800	-63	2,511	1,237	1,612	3,077	4,206	5,398	6,602	7,801	8,969
Other neutral reserves	1,624	1,055	1,166	1,321	1,082	1,082	1,082	1,082	1,082	1,082	1,082
Net profit/loss	-13	1,228	313	55	1,698	1,638	1,734	1,737	1,726	1,668	1,601
Equity attributable to shareholders of Deutsche Lufthansa AG	7,949	4,779	6,056	3,968	5,768	7,173	8,397	9,593	10,787	11,927	13,028
Minority Interests	95	60	52	63	77	77	77	77	77	77	77
Total Shareholders' Equity	8,044	4,839	6,108	4,031	5,845	7,250	8,474	9,670	10,864	12,004	13,105
Non-Current Provisions and Liabilities											
Pension provisions	2,165	5,844	4,718	7,231	6,626	6,626	6,626	6,626	6,626	6,626	6,626
Other Provisions	578	582	596	601	526	526	526	526	526	526	526
Borrowings and other financial liabilities	5,936	6,145	4,971	5,500	5,152	6,669	7,069	8,090	8,369	9,294	9,445
Advance payments received, deferred income and other non-financial liabilities	1,156	1,163	1,187	1,179	1,223	1,223	1,223	1,223	1,223	1,223	1,223
Derivative financial instruments	55	150	426	719	307	307	307	307	307	307	307
Deferred tax liabilities	364	94	146	239	346	346	346	346	346	346	346
Total Non-Current Provisions and Liabilities	10,254	13,978	12,044	15,469	14,180	15,697	16,097	17,118	17,397	18,322	18,473
Current Provisions and Liabilities											
Other provisions	818	894	868	953	1,075	993	1,024	1,049	1,073	1,094	1,113
Borrowings	616	963	1,514	594	1,339	1,339	1,339	1,339	1,339	1,339	1,339
Other financial liabilities	1,422	1,447	1,519	1,692	1,899	1,866	1,823	1,836	1,882	2,002	2,168
Trade payables	2,805	2,784	3,026	2,943	2,948	3,132	3,229	3,310	3,383	3,450	3,509
Liabilities from unused flight documents	2,359	2,612	2,635	2,848	2,901	2,901	2,901	2,901	2,901	2,901	2,901
Advance payments received, deferred income and other non-financial liabilities	939	933	964	924	918	918	918	918	918	918	918
Derivative financial instruments	37	2	183	766	1,221	1,221	1,221	1,221	1,221	1,221	1,221
Effective income tax obligations	71	107	247	228	136	136	136	136	136	136	136
Liabilities related to assets held for sale	716	0	0	26	0	0	0	0	0	0	0
Total Current Provisions and Liabilities	9,783	9,742	10,956	10,974	12,437	12,506	12,591	12,711	12,853	13,060	13,304
Total Liabilities	20,037	23,720	23,000	26,443	26,617	28,203	28,688	29,829	30,250	31,382	31,777
of which Debt	7,974	8,555	8,004	7,786	8,390	9,874	10,231	11,265	11,590	12,634	12,951
Total Shareholders' Equity and Liabilities	28,081	28,559	29,108	30,474	32,462	35,453	37,162	39,499	41,113	43,386	44,882

Appendix 3: Income Statement per Segment

in €m

Passenger Airline Group	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	21,544	22,855	22,838	22,636	23,821	24,620	25,574	26,325	26,973	27,509	27,924
of which traffic revenue	20,534	21,766	21,743	21,564	22,610	23,401	24,337	25,068	25,694	26,208	26,601
Inter-segment revenue	746	704	672	684	678	662	647	632	617	603	589
Total Revenue	22,290	23,559	23,510	23,320	24,499	25,282	26,221	26,957	27,590	28,112	28,513
Other operating Income	1,105	927	1,095	1,031	1,406	1,360	1,380	1,404	1,428	1,452	1,476
Total Operating Income	23,395	24,486	24,605	24,351	25,905	26,642	27,601	28,361	29,018	29,564	29,989
Total Operating Expenses	-23,046	-23,930	-24,092	-23,681	-24,508	-25,184	-25,922	-26,650	-27,298	-27,962	-28,545
of which cost of materials and services	-14,542	-15,749	-15,336	-15,161	-15,146	-15,404	-15,917	-16,403	-16,809	-17,231	-17,571
of which staff costs	-3,874	-3,647	-4,252	-4,234	-4,675	-4,636	-4,698	-4,770	-4,843	-4,916	-4,992
of which depreciation and amortization	-1,350	-1,415	-1,453	-1,178	-1,301	-1,379	-1,484	-1,589	-1,693	-1,795	-1,893
of which other operating expenses	-3,280	-3,119	-3,051	-3,108	-3,386	-3,765	-3,822	-3,887	-3,953	-4,020	-4,089
Operating Result	349	556	513	670	1,397	1,458	1,679	1,711	1,720	1,601	1,445
Other Segment Income	151	157	155	0	0	0	0	0	0	0	0
Other Segment Expense	-111	-142	-57	0	0	0	0	0	0	0	0
Results of equity investments	-34	-15	36	45	68	68	68	68	68	68	68
EBIT	355	556	647	715	1,465	1,526	1,747	1,779	1,788	1,669	1,513

in €m

Logistics	2 011	2 012	2 013	2 014	2 015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	2,917	2,662	2,419	2,410	2,331	2,206	2,132	2,102	2,103	2,155	2,260
of which traffic revenue	2,821	2,577	2,378	2,364	2,275	2,150	2,075	2,044	2,044	2,095	2,199
Inter-segment revenue	26	26	24	25	24	24	24	24	24	24	24
Total Revenue	2,943	2,688	2,443	2,435	2,355	2,230	2,156	2,126	2,127	2,179	2,284
Other operating Income	78	67	97	85	58	97	99	100	102	104	105
Total Operating Income	3,021	2,755	2,540	2,520	2,413	2,327	2,254	2,226	2,229	2,282	2,390
Operating Expenses	-2,772	-2,650	-2,461	-2,415	-2,435	-2,487	-2,559	-2,630	-2,692	-2,755	-2,810
of which cost of materials and services	-2,043	-1,953	-1,797	-1,690	-1,577	-1,654	-1,709	-1,761	-1,805	-1,850	-1,886
of which staff costs	-347	-357	-388	-387	-414	-425	-430	-437	-443	-450	-457
of which depreciation and amortization	-83	-58	-27	-64	-152	-80	-86	-92	-98	-104	-109
of which other operating expenses	-299	-282	-249	-274	-292	-329	-334	-340	-346	-352	-357
Operating Result	249	105	79	105	-22	-160	-305	-404	-463	-473	-420
Other Segment Income	17	10	10	0	0	0	0	0	0	0	0
Other Segment Expense	-1	-3	-16	0	0	0	0	0	0	0	0
Results of equity investments	-22	16	16	18	25	25	25	25	25	25	25
EBIT	243	128	89	123	3	-135	-280	-379	-438	-448	-395

in €m

MRO	2 011	2 012	2 013	2 014	2 015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	2,305	2,429	2,596	2,673	3,256	3,276	3,325	3,381	3,439	3,497	3,557
Inter-segment revenue	1,788	1,584	1,584	1,664	1,843	1,843	1,843	1,843	1,843	1,843	1,843
Total Revenue	4,093	4,013	4,180	4,337	5,099	5,119	5,168	5,224	5,282	5,340	5,400
Other operating Income	232	224	229	209	317	293	298	303	308	313	319
Total Operating Income	4,325	4,237	4,409	4,546	5,416	5,412	5,466	5,527	5,590	5,653	5,718
Operating Expenses	-4,068	-3,909	-4,005	-4,123	-4,971	-4,522	-4,634	-4,748	-4,850	-4,955	-5,048
of which cost of materials and services	-2,123	-1,966	-2,069	-2,154	-2,656	-2,226	-2,301	-2,371	-2,429	-2,490	-2,539
of which staff costs	-1,095	-1,227	-1,227	-1,186	-1,317	-1,360	-1,378	-1,399	-1,420	-1,442	-1,464
of which depreciation and amortization	-90	-101	-99	-93	-103	-100	-108	-116	-123	-131	-138
of which other operating expenses	-760	-615	-610	-690	-895	-835	-848	-862	-877	-892	-907
Operating Result	257	328	404	423	445	890	831	779	740	699	670
Other Segment Income	30	37	54	0	0	0	0	0	0	0	0
Other Segment Expense	-2	-3	-20	0	0	0	0	0	0	0	0
Results of equity investments	21	15	19	10	3	3	3	3	3	3	3
EBIT	306	377	457	433	448	893	834	782	743	702	673

in €m

Catering	2 011	2 012	2 013	2 014	2 015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	1,738	1,933	1,909	2,022	2,386	2,194	2,276	2,340	2,395	2,440	2,475
Inter-segment revenue	561	570	605	611	636	636	636	636	636	636	636
Total Revenue	2,299	2,503	2,514	2,633	3,022	2,830	2,912	2,976	3,031	3,076	3,111
Other operating Income	58	110	86	74	73	98	99	101	103	104	106
Total Operating Income	2,357	2,613	2,600	2,707	3,095	2,928	3,011	3,077	3,133	3,180	3,217
Operating Expenses	-2,272	-2,512	-2,495	-2,644	-3,032	-2,799	-2,865	-2,932	-2,994	-3,057	-3,114
of which cost of materials and services	-1,030	-1,124	-1,104	-1,156	-1,299	-1,159	-1,198	-1,234	-1,265	-1,297	-1,322
of which staff costs	-799	-914	-927	-964	-1,113	-1,056	-1,070	-1,087	-1,103	-1,120	-1,137
of which depreciation and amortization	-58	-65	-62	-79	-80	-71	-77	-82	-88	-93	-98
of which other operating expenses	-385	-409	-402	-445	-540	-512	-520	-529	-538	-547	-556
Operating Result	85	101	105	63	63	129	146	145	140	124	103
Other Segment Income	3	28	3	0	0	0	0	0	0	0	0
Other Segment Expense	-5	-12	-4	0	0	0	0	0	0	0	0
Results of equity investments	14	14	19	12	22	22	22	22	22	22	22
EBIT	97	131	123	75	85	151	168	167	162	146	125

in €m

Other	2 011	2 012	2 013	2 014	2 015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	0	0	0	270	262	262	262	262	262	262	262
Inter-segment revenue	0	0	0	365	222	222	222	222	222	222	222
Total Revenue	0	0	0	635	484	484	484	484	484	484	484
Other operating Income	1,354	1,310	1,051	1,297	2,031	1,693	1,718	1,747	1,777	1,807	1,838
Total Operating Income	1,354	1,310	1,051	1,932	2,515	2,177	2,202	2,231	2,261	2,291	2,322
Operating Expenses	-1,446	-1,571	-1,446	-2,308	-2,901	-2,198	-2,236	-2,279	-2,321	-2,364	-2,407
of which cost of materials and services	-97	-96	-46	-193	-193	-127	-131	-135	-139	-142	-145
of which staff costs	-318	-359	-343	-572	-563	-479	-485	-493	-500	-508	-516
of which depreciation and amortization	-43	-44	-19	-115	-79	-64	-69	-74	-78	-83	-88
of which other operating expenses	-988	-1,072	-1,038	-1,428	-2,066	-1,528	-1,551	-1,577	-1,604	-1,631	-1,659
Operating Result	-92	-261	-395	-376	-386	-21	-34	-47	-60	-73	-85
Other Segment Income	32	43	89	0	0	0	0	0	0	0	0
Other Segment Expense	-64	-29	-5	0	0	0	0	0	0	0	0
Results of equity investments	1	1	1	37	3	3	3	3	3	3	3
EBIT	-123	-246	-310	-339	-383	-18	-31	-44	-57	-70	-82

Appendix 4: Cash Flow Statement

in €m

Years	2016F	2017F	2018F	2019F	2020F	2021F
Operating Activities						
EBIT	1,637.9	1,733.6	1,736.7	1,726.4	1,668.0	1,600.6
D&A	1,764.9	1,900.3	2,034.9	2,167.7	2,297.8	2,424.1
Income tax	-554.0	-585.9	-586.9	-583.5	-564.0	-541.5
Change in NWC	87.2	-39.8	-33.2	-30.0	-27.2	-24.2
Total Cash from Operating Activities (CFO)	2,936.1	3,008.2	3,151.5	3,280.6	3,374.5	3,458.9
Investing Activities						
CAPEX	-2,893.6	-2,998.0	-3,092.1	-3,174.2	-3,242.6	-3,295.9
Other investments	454.8	503.3	551.6	593.4	637.0	673.9
Total Cash from Investing Activities (CFI)	-2,438.8	-2,494.7	-2,540.5	-2,580.8	-2,605.6	-2,622.0
Financing Activities						
Interest paid	-275.2	-323.9	-335.6	-369.5	-380.1	-414.4
Dividends paid	-233.0	-509.1	-541.0	-532.9	-527.5	-499.8
Issuance (Retirement) of Debt, Net	1,516.5	400.2	1,021.1	278.7	925.2	151.1
Total Cash from Financing Activities (CFF)	1,008.4	-432.7	144.5	-623.7	17.5	-763.1
Net Change in cash	1,505.6	80.8	755.5	76.2	786.4	73.8
Net Cash - Beginning Balance	1,099.0	2,604.6	2,685.5	3,441.0	3,517.1	4,303.5
Net Cash - Ending Balance	2,604.6	2,685.5	3,441.0	3,517.1	4,303.5	4,377.4

Appendix 5: Key Financial Ratios

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Liquidity Ratios											
Current Ratio (x)	0.97	1.00	0.88	0.75	0.72	0.84	0.85	0.91	0.92	0.97	0.97
Quick Ratio (x)	0.90	0.94	0.83	0.69	0.66	0.78	0.79	0.85	0.86	0.91	0.91
Cash Ratio (x)	0.09	0.15	0.14	0.09	0.09	0.21	0.21	0.27	0.27	0.33	0.33
Efficiency Ratios											
Total Assets Turnover (x)	1.02	1.06	1.03	0.98	0.99	0.92	0.90	0.87	0.86	0.83	0.81
Accounts Receivables Turnover (x)	8.14	8.30	8.15	7.71	7.46	7.25	7.33	7.31	7.30	7.29	7.28
Collection Period (days)	44.87	43.97	44.78	47.37	48.91	50.35	49.79	49.93	50.01	50.07	50.13
Inventory Turnover (x)	25.88	28.33	27.09	25.46	23.87	23.54	24.60	24.67	24.70	24.81	24.85
Days in Inventory (days)	14.10	12.88	13.47	14.34	15.29	15.50	14.84	14.80	14.78	14.71	14.69
Payables Turnover (x)	5.81	6.38	5.97	5.72	5.92	5.75	5.68	5.69	5.70	5.73	5.73
Payables Period (days)	62.77	57.20	61.15	63.81	61.66	63.53	64.30	64.12	64.03	63.75	63.66
Operating cycle (days)	58.97	56.86	58.25	61.70	64.20	65.86	64.63	64.73	64.78	64.78	64.82
Cash Cycle (days)	-3.81	-0.34	-2.90	-2.11	2.54	2.33	0.33	0.61	0.75	1.02	1.16
Profitability Ratios											
Gross Profit Margin (%)	42.26%	40.82%	42.25%	43.12%	45.60%	46.35%	46.21%	45.91%	45.76%	45.45%	45.30%
EBIT Margin (%)	2.94%	5.69%	3.25%	3.33%	5.23%	6.25%	6.45%	6.19%	6.00%	5.57%	5.23%
EBIT Margin-Passenger Airline Group (%)	1.59%	2.36%	2.75%	3.07%	5.98%	6.04%	6.66%	6.60%	6.48%	5.94%	5.31%
EBIT Margin-Logistics (%)	8.26%	4.76%	3.64%	5.05%	0.13%	-6.05%	-12.97%	-17.81%	-20.59%	-20.56%	-17.31%
EBIT Margin-MRO (%)	7.48%	9.39%	10.93%	9.98%	8.79%	17.45%	16.14%	14.98%	14.07%	13.14%	12.46%
EBIT Margin-Catering (%)	4.22%	5.23%	4.89%	2.85%	2.81%	5.34%	5.77%	5.60%	5.34%	4.74%	4.03%
Net Profit Margin (%)	-0.05%	4.07%	1.04%	0.18%	5.30%	5.03%	5.16%	5.05%	4.91%	4.65%	4.39%
ROA (%)	-0.05%	4.30%	1.08%	0.18%	5.23%	4.62%	4.67%	4.40%	4.20%	3.84%	3.57%
ROCE (%)	4.47%	9.25%	5.27%	5.31%	8.48%	9.48%	9.11%	8.30%	7.67%	6.82%	6.16%
ROE (%)	-0.16%	25.38%	5.12%	1.36%	29.05%	22.59%	20.46%	17.96%	15.89%	13.89%	12.21%
EPS (x)	-0.03	2.68	0.68	0.12	3.67	3.54	3.74	3.75	3.73	3.60	3.46
Solvency Ratios											
Long-and shor-term Debt Ratio (%)	28.40%	29.96%	27.50%	25.55%	25.85%	27.85%	27.53%	28.52%	28.19%	29.12%	28.86%
Long-term Debt Ratio (%)	21.14%	21.52%	17.08%	18.05%	15.87%	18.81%	19.02%	20.48%	20.35%	21.42%	21.04%
Debt to Equity Ratio (x)	0.99	1.77	1.31	1.93	1.44	1.36	1.21	1.16	1.07	1.05	0.99
Equity Multiplier (x)	3.49	5.90	4.77	7.56	5.55	4.89	4.39	4.08	3.78	3.61	3.42
Interest Coverage Ratio (x)	2.87	5.35	3.14	4.12	10.22	7.40	6.68	6.35	5.71	5.26	4.60
Equity Ratio	28.65%	16.94%	20.98%	13.23%	18.01%	20.45%	22.80%	24.48%	26.42%	27.67%	29.20%

Return on Assets: Measures how efficient the company is at using its assets to generate earnings.

Return on Capital Employed: Measures the efficiency with which its capital is employed.

Return on Equity: Measures how much profit a company generates with the shareholders' investment.

Appendix 6: Common-Size Income Statement

in %

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Traffic revenue	82.8%	82.3%	81.8%	81.3%	79.0%	78.5%	78.7%	78.8%	78.9%	78.9%	79.0%
Other revenue	17.2%	17.7%	18.2%	18.7%	21.0%	21.5%	21.3%	21.2%	21.1%	21.1%	21.0%
Total Revenue	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Changes in inventories and work performed by entity and capitalized	0.5%	0.4%	0.5%	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Other operating income	8.1%	9.2%	6.8%	6.3%	8.8%	8.8%	8.6%	8.5%	8.5%	8.5%	8.5%
Cost of materials and services	58.2%	59.6%	58.3%	57.6%	55.0%	54.3%	54.4%	54.7%	54.8%	55.1%	55.3%
Staff cost	23.2%	22.4%	24.5%	24.4%	25.2%	24.9%	24.5%	24.3%	24.1%	24.0%	24.0%
Depreciation, amortization and impairment	6.0%	6.1%	5.9%	5.1%	5.4%	5.4%	5.7%	5.9%	6.2%	6.4%	6.6%
Other operating expenses	18.4%	16.2%	15.8%	17.0%	19.0%	18.9%	18.6%	18.4%	18.3%	18.3%	18.3%
Profit/loss from operating activities	2.7%	5.4%	2.8%	2.9%	4.9%	5.9%	6.1%	5.8%	5.7%	5.2%	4.9%
Result of equity investments accounted for using the equity method	0.1%	0.1%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Result of other equity investments	0.3%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
EBIT	2.9%	5.7%	3.2%	3.3%	5.2%	6.3%	6.4%	6.2%	6.0%	5.6%	5.2%
Interest income	0.7%	0.6%	0.5%	0.5%	0.6%	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%
Interest Expenses and other similar expenses	1.0%	1.1%	1.0%	0.8%	0.5%	0.8%	1.0%	1.0%	1.1%	1.1%	1.1%
Other non-operating interest expense	0.6%	0.7%	0.7%	0.6%	0.6%	0.8%	0.7%	0.6%	0.6%	0.5%	0.4%
Other financial items	-0.4%	-0.2%	-0.3%	-1.9%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Profit/loss before income taxes	1.6%	4.3%	1.8%	0.6%	6.3%	6.8%	7.0%	6.8%	6.6%	6.3%	5.9%
Profit/loss from discontinued operations	1.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Income taxes	0.5%	0.3%	0.7%	0.3%	0.9%	1.7%	1.7%	1.7%	1.7%	1.6%	1.5%
Profit/loss after income taxes	0.0%	4.1%	1.1%	0.2%	5.4%	5.1%	5.2%	5.1%	5.0%	4.7%	4.5%
Profit/loss attributable to minority interests	0.1%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Net profit/loss attributable to shareholders of Deutsche Lufthansa AG	0.0%	4.1%	1.0%	0.2%	5.3%	5.0%	5.2%	5.0%	4.9%	4.7%	4.4%

Appendix 7: Common-Size Statement of Financial Position

in %

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Non-Current Assets											
Intangible Assets with an indefinite useful life including goodwill and other intangible assets	5.6%	5.5%	5.4%	5.2%	5.1%	5.0%	5.1%	5.0%	5.1%	5.1%	5.2%
Aircraft and reserve engines	41.3%	41.5%	42.5%	44.5%	44.9%	44.2%	45.2%	45.3%	46.1%	46.1%	46.8%
Repairable spare parts for aircraft	3.0%	3.1%	3.3%	3.6%	4.3%	3.9%	3.7%	3.5%	3.4%	3.2%	3.1%
Property, plant and other equipment	7.5%	7.3%	7.1%	6.9%	6.7%	6.5%	6.6%	6.5%	6.5%	6.4%	6.4%
Long Term Investments	5.1%	2.9%	3.3%	4.0%	2.3%	2.4%	2.6%	2.8%	3.0%	3.1%	3.3%
Loans and receivables	2.2%	1.6%	1.7%	1.7%	1.6%	1.5%	1.4%	1.3%	1.3%	1.2%	1.1%
Derivative financial instruments	1.2%	0.9%	1.2%	2.0%	3.8%	3.5%	3.3%	3.1%	3.0%	2.8%	2.7%
Deferred charges and prepaid expenses	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Effective Income tax receivables	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
Deferred tax assets	0.1%	2.6%	2.1%	4.9%	3.7%	3.4%	3.2%	3.0%	2.9%	2.8%	2.7%
Total Non-Current Assets	66.3%	65.8%	66.7%	72.9%	72.5%	70.5%	71.2%	70.6%	71.3%	70.7%	71.3%
Current Assets											
Inventories	2.2%	2.2%	2.2%	2.3%	2.3%	2.0%	2.0%	1.9%	1.9%	1.8%	1.8%
Trade receivables and other receivables	12.2%	12.6%	12.4%	13.1%	13.5%	12.4%	12.2%	11.8%	11.5%	11.2%	11.0%
Derivative financial instruments	1.5%	0.8%	1.6%	1.5%	1.4%	1.2%	1.2%	1.1%	1.1%	1.0%	1.0%
Deferred charges and prepaid expenses	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%
Effective income tax receivables	0.5%	0.4%	0.2%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Securities	11.1%	12.4%	10.8%	5.9%	6.1%	5.6%	5.4%	5.0%	4.9%	4.6%	4.4%
Cash and Cash Equivalents	3.2%	5.0%	5.3%	3.1%	3.4%	7.3%	7.2%	8.7%	8.6%	9.9%	9.8%
Assets held for sale	2.4%	0.4%	0.2%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Current Assets	33.7%	34.2%	33.3%	27.1%	27.5%	29.5%	28.8%	29.4%	28.7%	29.3%	28.7%
Total Assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Shareholders' Equity											
Issued Capital	4.2%	4.1%	4.1%	3.9%	3.7%	3.4%	3.2%	3.0%	2.9%	2.7%	2.6%
Capital reserve	4.9%	4.8%	3.0%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%
Retained earnings	13.5%	0.2%	8.6%	4.1%	5.0%	8.7%	11.3%	13.7%	16.1%	18.0%	20.0%
Other neutral reserves	5.8%	3.7%	4.0%	4.3%	3.3%	3.1%	2.9%	2.7%	2.6%	2.5%	2.4%
Net profit/loss	0.0%	4.3%	1.1%	0.2%	5.2%	4.6%	4.7%	4.4%	4.2%	3.8%	3.6%
Equity attributable to shareholders of Deutsche Lufthansa AG	28.3%	16.7%	20.8%	13.0%	17.8%	20.2%	22.6%	24.3%	26.2%	27.5%	29.0%
Minority Interests	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Total shareholders' Equity	28.6%	16.9%	21.0%	13.2%	18.0%	20.4%	22.8%	24.5%	26.4%	27.7%	29.2%
Non-Current Provisions and Liabilities											
Pension provisions	7.7%	20.5%	16.2%	23.7%	20.4%	18.7%	17.8%	16.8%	16.1%	15.3%	14.8%
Other Provisions	2.1%	2.0%	2.0%	2.0%	1.6%	1.5%	1.4%	1.3%	1.3%	1.2%	1.2%
Borrowings and other financial liabilities	21.1%	21.5%	17.1%	18.0%	15.9%	18.8%	19.0%	20.5%	20.4%	21.4%	21.0%
Advance payments received, deferred income and other non-financial liabilities	4.1%	4.1%	4.1%	3.9%	3.8%	3.4%	3.3%	3.1%	3.0%	2.8%	2.7%
Derivative financial instruments	0.2%	0.5%	1.5%	2.4%	0.9%	0.9%	0.8%	0.8%	0.7%	0.7%	0.7%
Deferred tax liabilities	1.3%	0.3%	0.5%	0.8%	1.1%	1.0%	0.9%	0.9%	0.8%	0.8%	0.8%
Total Non-Current Provisions and Liabilities	36.5%	48.9%	41.4%	50.8%	43.7%	44.3%	43.3%	43.3%	42.3%	42.2%	41.2%
Current Provisions and Liabilities											
Other provisions	2.9%	3.1%	3.0%	3.1%	3.3%	2.8%	2.8%	2.7%	2.6%	2.5%	2.5%
Borrowings	2.2%	3.4%	5.2%	1.9%	4.1%	3.8%	3.6%	3.4%	3.3%	3.1%	3.0%
Other financial liabilities	5.1%	5.1%	5.2%	5.6%	5.8%	5.3%	4.9%	4.6%	4.6%	4.6%	4.8%
Trade payables	10.0%	9.7%	10.4%	9.7%	9.1%	8.8%	8.7%	8.4%	8.2%	8.0%	7.8%
Liabilities from unused flight documents	8.4%	9.1%	9.1%	9.3%	8.9%	8.2%	7.8%	7.3%	7.1%	6.7%	6.5%
Advance payments received, deferred income and other non-financial liabilities	3.3%	3.3%	3.3%	3.0%	2.8%	2.6%	2.5%	2.3%	2.2%	2.1%	2.0%
Derivative financial instruments	0.1%	0.0%	0.6%	2.5%	3.8%	3.4%	3.3%	3.1%	3.0%	2.8%	2.7%
Effective income tax obligations	0.3%	0.4%	0.8%	0.7%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%
Liabilities related to assets held for sale	2.5%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Current Provisions and Liabilities	34.8%	34.1%	37.6%	36.0%	38.3%	35.3%	33.9%	32.2%	31.3%	30.1%	29.6%
Total Liabilities	71.4%	83.1%	79.0%	86.8%	82.0%	79.6%	77.2%	75.5%	73.6%	72.3%	70.8%
of which Debt	28.4%	30.0%	27.5%	25.5%	25.8%	27.8%	27.5%	28.5%	28.2%	29.1%	28.9%
Total Shareholders' Equity and Liabilities	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix 8: Common-Size Income Statement per Segment

in %

Passenger Airline Group	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	92.1%	93.3%	92.8%	93.0%	92.0%	92.4%	92.7%	92.8%	93.0%	93.0%	93.1%
of which traffic revenue	87.8%	88.9%	88.4%	88.6%	87.3%	87.8%	88.2%	88.4%	88.5%	88.7%	88.7%
Inter-segment revenue	3.2%	2.9%	2.7%	2.8%	2.6%	2.5%	2.3%	2.2%	2.1%	2.0%	2.0%
Total Revenue	95.3%	96.2%	95.5%	95.8%	94.6%	94.9%	95.0%	95.1%	95.1%	95.1%	95.1%
Other operating Income	4.7%	3.8%	4.5%	4.2%	5.4%	5.1%	5.0%	4.9%	4.9%	4.9%	4.9%
Total Operating Income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Operating Expenses	98.5%	97.7%	97.9%	97.2%	94.6%	94.5%	93.9%	94.0%	94.1%	94.6%	95.2%
of which cost of materials and services	62.2%	64.3%	62.3%	62.3%	58.5%	57.8%	57.7%	57.8%	57.9%	58.3%	58.6%
of which staff costs	16.6%	14.9%	17.3%	17.4%	18.0%	17.4%	17.0%	16.8%	16.7%	16.6%	16.6%
of which depreciation and amortization	5.8%	5.8%	5.9%	4.8%	5.0%	5.2%	5.4%	5.6%	5.8%	6.1%	6.3%
of which other operating expenses	14.0%	12.7%	12.4%	12.8%	13.1%	14.1%	13.8%	13.7%	13.6%	13.6%	13.6%
Operating Result	1.5%	2.3%	2.1%	2.8%	5.4%	5.5%	6.1%	6.0%	5.9%	5.4%	4.8%
Other Segment Income	0.6%	0.6%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Segment Expense	0.5%	0.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Results of equity investments	0.1%	0.1%	0.1%	0.2%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
EBIT	1.5%	2.3%	2.6%	2.9%	5.7%	5.7%	6.3%	6.3%	6.2%	5.6%	5.0%

in %

Logistics	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	96.6%	96.6%	95.2%	95.6%	96.6%	94.8%	94.6%	94.4%	94.3%	94.4%	94.6%
of which traffic revenue	93.4%	93.5%	93.6%	93.8%	94.3%	92.4%	92.0%	91.8%	91.7%	91.8%	92.0%
Inter-segment revenue	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%	1.0%
Total Revenue	97.4%	97.6%	96.2%	96.6%	97.6%	95.8%	95.6%	95.5%	95.4%	95.5%	95.6%
Other operating Income	2.6%	2.4%	3.8%	3.4%	2.4%	4.2%	4.4%	4.5%	4.6%	4.5%	4.4%
Total Operating Income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Expenses	91.8%	96.2%	96.9%	95.8%	100.9%	106.9%	113.5%	118.1%	120.8%	120.7%	117.6%
of which cost of materials and services	67.6%	70.9%	70.7%	67.1%	65.4%	71.1%	75.8%	79.1%	81.0%	81.1%	78.9%
of which staff costs	11.5%	13.0%	15.3%	15.4%	17.2%	18.2%	19.1%	19.6%	19.9%	19.7%	19.1%
of which depreciation and amortization	2.7%	2.1%	1.1%	2.5%	6.3%	3.4%	3.8%	4.1%	4.4%	4.5%	4.6%
of which other operating expenses	9.9%	10.2%	9.8%	10.9%	12.1%	14.1%	14.8%	15.3%	15.5%	15.4%	15.0%
Operating Result	8.2%	3.8%	3.1%	4.2%	0.9%	6.9%	13.5%	18.1%	20.8%	20.7%	17.6%
Other Segment Income	0.6%	0.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Segment Expense	0.0%	0.1%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Results of equity investments	0.7%	0.6%	0.6%	0.7%	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%
EBIT	8.0%	4.6%	3.5%	4.9%	0.1%	5.8%	12.4%	17.0%	19.6%	19.6%	16.5%

in %

MRO	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	53.3%	57.3%	58.9%	58.8%	60.1%	60.5%	60.8%	61.2%	61.5%	61.9%	62.2%
Inter-segment revenue	41.3%	37.4%	35.9%	36.6%	34.0%	34.1%	33.7%	33.3%	33.0%	32.6%	32.2%
Total Revenue	94.6%	94.7%	94.8%	95.4%	94.1%	94.6%	94.6%	94.5%	94.5%	94.5%	94.4%
Other operating Income	5.4%	5.3%	5.2%	4.6%	5.9%	5.4%	5.4%	5.5%	5.5%	5.5%	5.6%
Total Operating Income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Expenses	94.1%	92.3%	90.8%	90.7%	91.8%	83.5%	84.8%	85.9%	86.8%	87.6%	88.3%
of which cost of materials and services	49.1%	46.4%	46.9%	47.4%	49.0%	41.1%	42.1%	42.9%	43.5%	44.1%	44.4%
of which staff costs	25.3%	29.0%	27.8%	26.1%	24.3%	25.1%	25.2%	25.3%	25.4%	25.5%	25.6%
of which depreciation and amortization	2.1%	2.4%	2.2%	2.0%	1.9%	1.9%	2.0%	2.1%	2.2%	2.3%	2.4%
of which other operating expenses	17.6%	14.5%	13.8%	15.2%	16.5%	15.4%	15.5%	15.6%	15.7%	15.8%	15.9%
Operating Result	5.9%	7.7%	9.2%	9.3%	8.2%	16.5%	15.2%	14.1%	13.2%	12.4%	11.7%
Other Segment Income	0.7%	0.9%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Segment Expense	0.0%	0.1%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Results of equity investments	0.5%	0.4%	0.4%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
EBIT	7.1%	8.9%	10.4%	9.5%	8.3%	16.5%	15.3%	14.2%	13.3%	12.4%	11.8%

in %

Catering	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	73.7%	74.0%	73.4%	74.7%	77.1%	74.9%	75.6%	76.1%	76.4%	76.7%	76.9%
Inter-segment revenue	23.8%	21.8%	23.3%	22.6%	20.5%	21.7%	21.1%	20.7%	20.3%	20.0%	19.8%
Total Revenue	97.5%	95.8%	96.7%	97.3%	97.6%	96.7%	96.7%	96.7%	96.7%	96.7%	96.7%
Other operating Income	2.5%	4.2%	3.3%	2.7%	2.4%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Total Operating Income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Expenses	96.4%	96.1%	96.0%	97.7%	98.0%	95.6%	95.1%	95.3%	95.5%	96.1%	96.8%
of which cost of materials and services	43.7%	43.0%	42.5%	42.7%	42.0%	39.6%	39.8%	40.1%	40.4%	40.8%	41.1%
of which staff costs	33.9%	35.0%	35.7%	35.6%	36.0%	36.1%	35.5%	35.3%	35.2%	35.2%	35.3%
of which depreciation and amortization	2.5%	2.5%	2.4%	2.9%	2.6%	2.4%	2.6%	2.7%	2.8%	2.9%	3.1%
of which other operating expenses	16.3%	15.7%	15.5%	16.4%	17.4%	17.5%	17.3%	17.2%	17.2%	17.2%	17.3%
Operating Result	3.6%	3.9%	4.0%	2.3%	2.0%	4.4%	4.9%	4.7%	4.5%	3.9%	3.2%
Other Segment Income	0.1%	1.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Segment Expense	0.2%	0.5%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Results of equity investments	0.6%	0.5%	0.7%	0.4%	0.7%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%
EBIT	4.1%	5.0%	4.7%	2.8%	2.7%	5.2%	5.6%	5.4%	5.2%	4.6%	3.9%

in %

Other	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
External revenue	0.0%	0.0%	0.0%	14.0%	10.4%	12.0%	11.9%	11.7%	11.6%	11.4%	11.3%
Inter-segment revenue	0.0%	0.0%	0.0%	18.9%	8.8%	10.2%	10.1%	9.9%	9.8%	9.7%	9.6%
Total Revenue	0.0%	0.0%	0.0%	32.9%	19.2%	22.2%	22.0%	21.7%	21.4%	21.1%	20.8%
Other operating Income	100.0%	100.0%	100.0%	67.1%	80.8%	77.8%	78.0%	78.3%	78.6%	78.9%	79.2%
Total Operating Income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Expenses	106.8%	119.9%	137.6%	119.5%	115.3%	101.0%	101.5%	102.1%	102.7%	103.2%	103.7%
of which cost of materials and services	7.2%	7.3%	4.4%	10.0%	7.7%	5.8%	6.0%	6.1%	6.1%	6.2%	6.2%
of which staff costs	23.5%	27.4%	32.6%	29.6%	22.4%	22.0%	22.0%	22.1%	22.1%	22.2%	22.2%
of which depreciation and amortization	3.2%	3.4%	1.8%	6.0%	3.1%	2.9%	3.1%	3.3%	3.5%	3.6%	3.8%
of which other operating expenses	73.0%	81.8%	98.8%	73.9%	82.1%	70.2%	70.4%	70.7%	70.9%	71.2%	71.4%
Operating Result	6.8%	19.9%	37.6%	19.5%	15.3%	1.0%	1.5%	2.1%	2.7%	3.2%	3.7%
Other Segment Income	2.4%	3.3%	8.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Segment Expense	4.7%	2.2%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Results of equity investments	0.1%	0.1%	0.1%	1.9%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
EBIT	9.1%	18.8%	29.5%	17.5%	15.2%	0.8%	1.4%	2.0%	2.5%	3.1%	3.5%

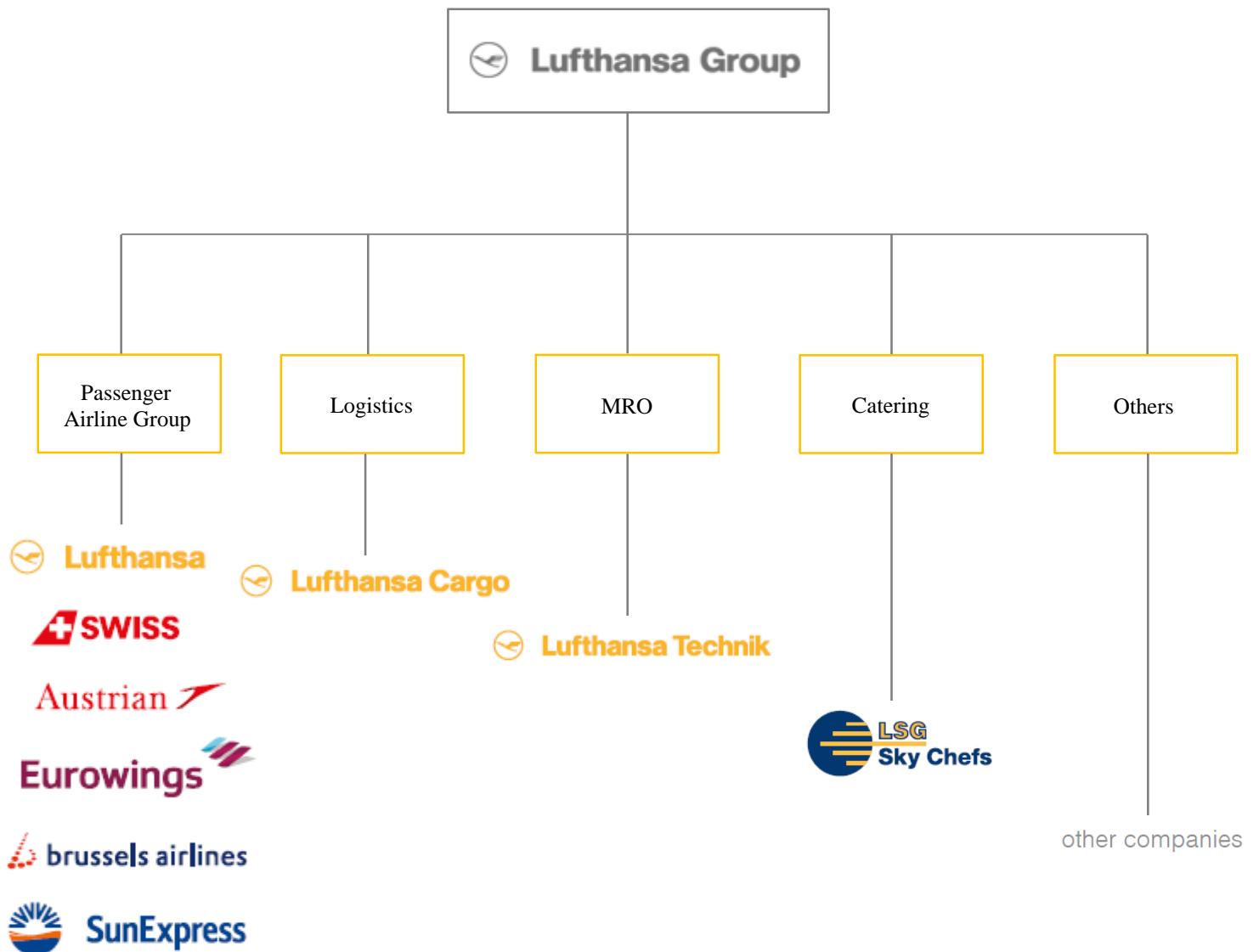
Appendix 9: Forecasting Assumptions

Consolidated Income Statement	Change							Assumption
	Unit	2016F	2017F	2018F	2019F	2020F	2021F	
Inflation Rate	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate from Pwc projections
Traffic revenue								Sum of the Traffic revenue from the PAG and Logistics Segment
Other revenue	%	0.60%	1,50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Changes in inventories and work performed by entity and capitalized	%	0.00%	0,00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other operating income								Sum of Other operating income from all the segments
Cost of materials and services								Appendix 14
Staff cost								Appendix 14
Depreciation, amortization and impairment								Appendix 14
Other operating expenses								Sum of Other operating expenses from all the segments
Result of equity investments accounted for using the equity method	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Result of other equity investments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Interest income	%	0.58%	0.58%	0.58%	0.58%	0.58%	0.58%	Percentage of total assets
Interest Expenses and other similar expenses	%	3.28%	3.28%	3.28%	3.28%	3.28%	3.28%	Percentage of total debt
Other non-operating interest expense	%	0.81%	0.81%	0.81%	0.81%	0.81%	0.81%	Percentage of total Liabilities plus the difference in pension provisions
Other financial items	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Profit/loss from discontinued operations	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Income taxes	%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	15% for corporation tax plus 10% for trade tax and solidarity surcharge
Profit/loss attributable to minority interests	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Weighted average number of shares	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Dividend payout ratio	%	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	Between the aim of LHA of 10% to 25% of EBIT

Consolidated Balance Sheet	Change							Assumption
	Unit	2016F	2017F	2018F	2019F	2020F	2021F	
Non-Current Assets								
Intangible Assets with an indefinite useful life including goodwill and other intangible assets								In line with Capex
Aircraft and reserve engines	%	7.50%	7.00%	6.50%	6.00%	5.50%	5.00%	In line with the fleet strategy
Repairable spare parts for aircraft								In line with Capex
Property, plant and other equipment								In line with Capex
Long Term Investments								In line with Equity Investments
Loans and receivables	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Derivative financial instruments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Deferred charges and prepaid expenses	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Effective Income tax receivables	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Deferred tax assets	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Current Assets								
Inventories	%	2.22%	2.22%	2.22%	2.22%	2.22%	2.22%	Percentage of total revenue
Trade receivables and other receivables	%	13.50%	13.50%	13.50%	13.50%	13.50%	13.50%	Percentage of total revenue
Derivative financial instruments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Deferred charges and prepaid expenses	%	0.54%	0.54%	0.54%	0.54%	0.54%	0.54%	Percentage of total revenue
Effective income tax receivables	%	0.35%	0.35%	0.35%	0.35%	0.35%	0.35%	Percentage of total revenue
Securities	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Cash and Cash Equivalents	%	8.00%	8.00%	10.00%	10.00%	12.00%	12.00%	Percentage of total revenue
Assets held for sale	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Shareholders' Equity								
Issued Capital	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Capital reserve	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Retained earnings								In line with Income Statement
Other neutral reserves	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Minority Interests	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Non-Current Provisions and Liabilities								
Pension provisions	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other Provisions	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Borrowings and other financial liabilities								In line with Cash Flow Statement
Advance payments received, deferred income and other non-financial liabilities	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Derivative financial instruments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Deferred tax liabilities	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Current Provisions and Liabilities								
Other provisions	%	3.05%	3.05%	3.05%	3.05%	3.05%	3.05%	Percentage of total revenue
Borrowings	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Changes in debt are primarily affect the long term debt
Other financial liabilities								In line with long term debt provisions
Trade payables	%	9.62%	9.62%	9.62%	9.62%	9.62%	9.62%	Percentage of total revenue
Liabilities from unused flight documents	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Advance payments received, deferred income and other non-financial liabilities	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Derivative financial instruments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Effective income tax obligations	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Liabilities related to assets held for sale	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value

Income Statement Per Segment	Change							Assumption
	Unit	2016F	2017F	2018F	2019F	2020F	2021F	
Passenger Airline Group								
Traffic revenue	%	3.50%	4.00%	3.00%	2.50%	2.00%	1.50%	In line with expected demand and LHA forecasts
Revenue other than traffic	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Inter-segment revenue	%	-2.32%	-2.32%	-2.32%	-2.32%	-2.32%	-2.32%	Based on the 5 year historical average growth
Other operating Income								Appendix 14
of which cost of materials and services								Appendix 14
of which staff costs								Appendix 14
of which depreciation and amortization								Appendix 14
of which other operating expenses								Appendix 14
Other Segment Income	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other Segment Expense	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Results of equity investments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Logistics								
Traffic revenue	%	-5.50%	-3.50%	-1.50%	0.00%	2.50%	5.00%	In line with expected market yields and LHA forecasts
Revenue other than traffic	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Inter-segment revenue	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other operating Income								Appendix 14
of which cost of materials and services								Appendix 14
of which staff costs								Appendix 14
of which depreciation and amortization								Appendix 14
of which other operating expenses								Appendix 14
Other Segment Income	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other Segment Expense	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Results of equity investments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
MRO								
External revenue	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Inter-segment revenue	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other operating Income								Appendix 14
of which cost of materials and services								Appendix 14
of which staff costs								Appendix 14
of which depreciation and amortization								Appendix 14
of which other operating expenses								Appendix 14
Other Segment Income	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other Segment Expense	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Results of equity investments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Catering								
External revenue	%	8.68%	8.68%	8.68%	8.68%	8.68%	8.68%	Percentage of total PAG revenue
Inter-segment revenue	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other operating Income								Appendix 14
of which cost of materials and services								Appendix 14
of which staff costs								Appendix 14
of which depreciation and amortization								Appendix 14
of which other operating expenses								Appendix 14
Other Segment Income	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other Segment Expense	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Results of equity investments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other								
External revenue	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Inter-segment revenue	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other operating Income								Appendix 14
of which cost of materials and services								Appendix 14
of which staff costs								Appendix 14
of which depreciation and amortization								Appendix 14
of which other operating expenses								Appendix 14
Other Segment Income	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Other Segment Expense	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Results of equity investments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value

Appendix 10: Business Structure



Airline Company	Equity Stake
Lufthansa Airlines	100%
Swiss Airlines	100%
Austrian Airlines	100%
Eurowings	100%
Brussel Airlines	45%
SunExpress	50%

Appendix 11: Valuation Methods

A wide range of models can be used to value an asset, from the simpler to the most sophisticated. Despite the different assumptions, these models share some common characteristics and can be classified in broader terms (Damodoran, 2012).

The three main approaches to valuation are the Discounted Cash Flow valuation, the Relative Valuation and the Contingent Claim Valuation. However, we are going to focus on the valuation models that we used to evaluate LHA. They are: the **Discounted Cash Flow valuation** and the **Relative Valuation**.

Discounted Cash Flow Valuation

This method values companies based on their NPV (Net Present Value) of its future cash flows which are discounted by a certain discount rate (Stieger, 2008).

$$NPV = \sum_{t=0}^n \frac{FCF_t}{(1+r)^t}$$

Where, r is the discount rate applied, FCF_t is the Free Cash Flow in period t and n is the life of the asset.

This valuation model can vary a couple of dimension, we are going to analyze three paths to the discounted cash flow valuation, the **Equity Valuation Model**, the **Firm Valuation Model** and the **Adjusted Present value model (APV)**.

The **Equity Valuation Model** evaluates the company from the shareholder perspective, it only considers the equity stake of the business. The market value of equity is computed by discounting the expected cash flows at the cost of equity (Damodoran 2012). This model follows two main approaches, the **Dividend Discount Model (DDM)** and the **Free Cash Flow to the Equity (FCFE)**.

- **Dividend Discount Model (DDM)**

This approach represents the oldest discounted cash flow valuation in practice (Damodoran, 2006). The value of a stock is the net present value of the dividends that we expect to obtain (Fernandez, 2013).

$$\text{Value per share of stock} = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+k_e)^t}$$

Where, $E(DPS_t)$ are the expected dividends per share and k_e is the cost of equity.

Gordon Growth Model (GGM) is a variation of DDM, which assumes an annual percentage growth in dividends (Farrel, 1985). This model requires to forecast the average future growth rate in dividends (Foerster and Sapp, 2005).

$$\text{Value of Stock} = \frac{DPS_1}{k_e - g}$$

Where, DPS_1 are the expected dividends one year from now, k_e is the cost of equity and g is the growth rate in dividends.

- **Free Cash Flow to Equity (FCFE)**

This approach is a variant of the DDM model where we discount potential dividends rather than actual dividends (Damodoran, 1994). For this, we use the free cash flow to equity (FCFE), which is the cash flow available to the company's equity holders (Stieger, 2008).

$$\text{Value of Equity} = \sum_{t=1}^{t=n} \frac{CF \text{ to Equity}_t}{(1+k_e)^t}$$

To compute the **Free cash Flow to equity (FCFE)**, we can use the following formula:

$$FCFE = Net\ Income + Depreciation - Capital\ Expenditures - Change\ in\ non-cash\ Working\ Capital - (New\ Debt\ Issued - Debt\ Repayment)$$

Source: Damodoran 2006

The **Firm Valuation Model** values the entire company, including stockholders, bondholders and preferred stockholders (Damodoran 2012). For this, we use the free cash flow to the firm (FCFF), which is the cash flow available to debt holders and equity holders (Stieger, 2008). We use this model to evaluate companies that reaches a steady state after n years and starts to grow at a stable growth rate, by computing the present values of the FCFF, discounted at the Weighted Average Cost of Capital (WACC) assuming a stable growth rate (Damodoran, 2006). The WACC rate is the cost of the different components of financing that the company uses, weighted by their market value proportions (Damodoran 2012).

$$Value\ of\ Firm = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{FCFF_{n+1}}{(1 + WACC)^n}$$

Where, **FCFF_t** is the expected FCFF in year t, **FCFF_{n + 1}** is the FCFF in the terminal value and **g_n** is the growth rate.

To compute the **Free Cash Flow to the Firm (FCFF)**, we can use the following formula:

$$FCFF = After-Tax\ Operating\ Income - (Capital\ Expenditures - Depreciations) - Change\ in\ non-cash\ Working\ Capital$$

Source: Damodoran 2006

The **Adjusted Present Value (APV)** approach in accordance to Luehrman 1997, is "to analyze financial maneuvers separately and then add their value to that of the business". In this model, first, we value the firm without debt by discounting the expected FCFF at the unlevered cost of equity (k_u), then we compute the present value of the interest tax savings generated by borrowing a certain amount of money, and finally, we perform an assessment on the probability that the firm will go bankrupt, and the expected costs of bankruptcy (Damodoran, 2012).

$$Value\ of\ Firm = Value\ of\ Business\ with\ 100\%\ equity\ financing + Present\ Value\ of\ Expected\ tax\ benefits\ of\ Debts - Expected\ Bankruptcy\ Costs$$

Source: Damodoran 2006

Relative Valuation

This method values companies based on how similar companies are currently priced in the market (Damdoran, 2012). According to Fernandez 2001, the multiples can be divided into three groups: Multiples based on the **Company's Capitalization**, multiples based on the **Company's Value** and **Growth-Referenced multiples**. The company's value is obtained by multiplying the ratio from the comparable companies by the measure performance of the company being valued (Kaplan and Ruback, 1994).

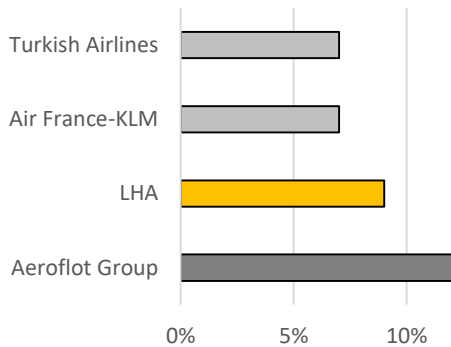
This method is useful in a second stage of valuation, after using another valuation method in order to make a comparison between the firm value and the firms that are compared (Fernandez, 2002).

Company's Capitalization	Company's Value	Growth Referenced
Price Earnings Ratio (PER)	Enterprise Value to EBITDA (EV/EBITDA)	PER to Earnings Per Share growth (P/EG)
Price to Sales (P/S)	Enterprise Value to Sales (EV/Sales)	Enterprise Value to EBITDA growth (EV/EG)
Price to Cash Earnings (P/CE)	Enterprise value to unlevered Free Cash Flow (EV/FCF)	
Price to Book Value (P/BV)		

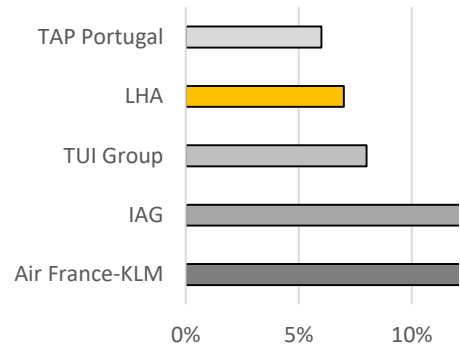
Source: Fernandez 2002

Appendix 12: Competitors Analysis

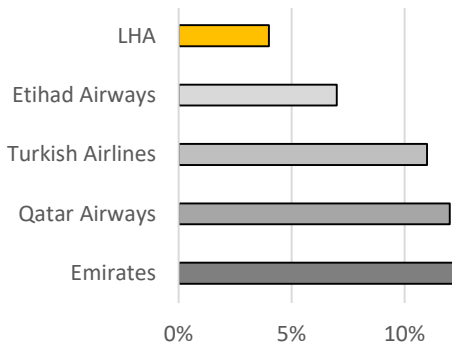
Share of Seats from Europe to Asia-Pacific
Source: CAPA, OAG



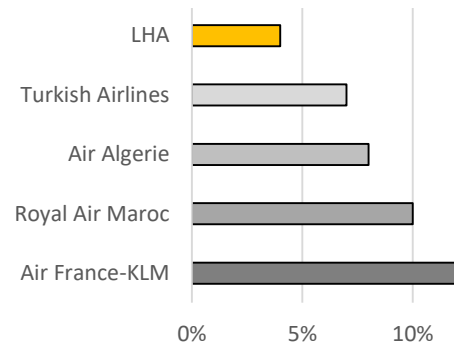
Share of Seats from Europe to Latin America
Source: CAPA, OAG



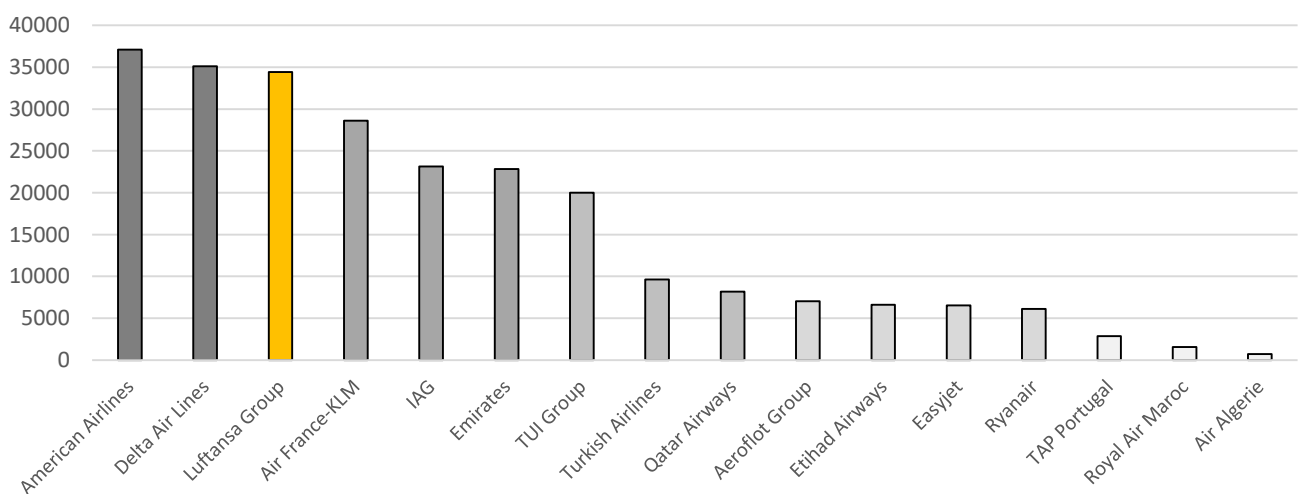
Share of Seats from Europe to Middle East
Source: CAPA, OAG



Share of Seats from Europe to Africa
Source: CAPA, OAG



Competitors by revenues (EUR millions)
Source: Top Airlines Rankings 2015



Appendix 13: Competitors Resume

Air France-KLM: Founded in 2004, with headquarters at Charles de Gaulle Airport and Amsterdam Airport Schiphol, it is the result of a merger between Air France and KLM. Member of the SkyTeam Airline Alliance. The total fleet is consisted of 534 aircraft that offers a global route network of 316 destinations.

International Airline Group: Founded in 2011, with headquarters in London and Madrid, it is the result of a merger between British Airways and Iberia. It is the flag carrier airlines of United Kingdom and Spain. Member of the Oneworld Alliance. The total fleet is consisted of 529 aircraft that offers a global route network of 274 destinations.

Turkish Airlines: Founded in 1933, with headquarters at Istanbul Atatürk Airport, it is the flag carrier airline of Turkey and a member of the Star Alliance. The total fleet is consisted of 330 aircraft that offers a global route network of 283 destinations.

Ryanair: Founded in 1984, with headquarters at Dublin Airport, it is an Irish low cost airline company. The total fleet is consisted of 315 aircraft that offers a global route network of 192 destinations.

Easyjet: Founded in 1995, with headquarters at London Luton Airport, it is a British low cost airline company. The total fleet is consisted of 230 aircraft that offers a global route network of 134 destinations.

American Airlines: Founded in 1926, with headquarters in Texas, it is an American Airline Company and a member of the Oneworld Airline Alliance. The total fleet is consisted of 945 aircraft that offers a global route network of 344 destinations.

Delta Air Lines: Founded in 1924, with headquarters at Hartsfield–Jackson Atlanta International Airport, it is an American Airline Company and a member of the SkyTeam Alliance. The total fleet is consisted of 809 aircraft that offers a global route network of 334 destinations.

Aeroflot Group: Founded in 1923, with headquarters in Moscow, it is the flag carrier airline of Russia and a member of the SkyTeam Alliance. The total fleet is consisted of 162 aircraft that offers a global route network of 129 destinations.

TAP Portugal: Founded in 1945, with headquarters at Lisbon Portela Airport , it is the flag carrier airline of Portugal and a member of the Star Alliance. The total fleet is consisted of 85 aircraft that offers a global route network of 88 destinations.

TUI Group: Founded in 1923, with headquarters in Hannover, it is a Travel, leisure and tourism company that owns travel agencies, airlines, hotels, cruise ships and retail shops. The total fleet is consisted of 130 aircraft that offers a global route network of 180 destinations.

Air Algérie: Founded in 1947, with headquarters in Algiers, it is the flag carrier airline of Algeria and a member of the Arab Air Carriers Organization, International Air Transport Association and African Airlines Association. The total fleet is consisted of 51 aircraft that offers a global route network of 69 destinations.

Royal Air Maroc: Founded in 1957, with headquarters at Casablanca-Anfa Airport, it is the flag carrier airline of Morocco. The total fleet is consisted of 53 aircraft that offers a global route network of 94 destinations.

Etihad Airways: Founded in 2003, with headquarters at Abu Dhabi International Airport, it is a flag company of the United Arab Emirates and a member of the Etihad Airways Partners. The total fleet is consisted of 122 aircraft that offers a global route network of 90 destinations.

Qatar Airways: Founded in 1993, with headquarters at Qatar Airways Tower, it is the flag carrier airline of Qatar and a member of the Oneworld Alliance. The total fleet is consisted of 175 aircraft that offers a global route network of 151 destinations.

Emirates: Founded in 1985, with headquarters at in Dubai, it is a subsidiary of the Emirates Group. The total fleet is consisted of 251 aircraft that offers a global route network of 136 destinations.

Appendix 14: Forecasting Analysis

- CMS**

COST OF MATERIALS AND SERVICES	Unit	Change						Assumption
		2016F	2017F	2018F	2019F	2020F	2021F	
Aircraft fuel and lubricants	%	22.84%	22.84%	22.84%	22.84%	22.84%	22.84%	Percentage of traffic revenue equal to 2015 percentage value
Other raw material, consumables and supplies	%	7.67%	7.67%	7.67%	7.67%	7.67%	7.67%	Percentage of total assets
Purchased goods	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Fees and charges	%	22.32%	22.32%	22.32%	22.32%	22.32%	22.32%	Percentage of Total traffic revenue
Charter expenses	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation Rate
External MRO services	%	4.66%	4.66%	4.66%	4.66%	4.66%	4.66%	Percentage of Total traffic revenue
In-flight services	%	12.91%	12.91%	12.91%	12.91%	12.91%	12.91%	Percentage of Catering total revenue
Operating lease payments	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
External IT services	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Other services	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation Rate
PAG CMS	%	87.18%	87.18%	87.18%	87.18%	87.18%	87.18%	Percentage of total Cost of material and services
Logistics CMS	%	9.36%	9.36%	9.36%	9.36%	9.36%	9.36%	Percentage of total Cost of material and services
MRO CMS	%	12.60%	12.60%	12.60%	12.60%	12.60%	12.60%	Percentage of total Cost of material and services
Catering CMS	%	6.56%	6.56%	6.56%	6.56%	6.56%	6.56%	Percentage of total Cost of material and services
Other CMS	%	0.72%	0.72%	0.72%	0.72%	0.72%	0.72%	Percentage of total Cost of material and services

in €m

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Aircraft fuel and lubricants	6,276	7,392	7,115	6,751	5,784	5,836	6,033	6,192	6,335	6,464	6,578
Other raw material, consumables and supplies	2,127	2,157	2,212	2,252	2,670	2,719	2,850	3,030	3,153	3,328	3,442
Purchased goods	432	455	440	476	549	549	549	549	549	549	549
Total cost of raw materials, consumables and supplies and of purchased goods	8,835	10,004	9,767	9,479	9,003	9,104	9,432	9,771	10,038	10,341	10,570
Fees and charges	5,000	5,167	5,167	5,265	5,651	5,703	5,895	6,051	6,191	6,317	6,428
Charter expenses	617	568	321	215	235	236	240	244	248	252	257
External MRO services	1,105	997	1,050	1,133	1,341	1,191	1,231	1,263	1,293	1,319	1,342
In-flight services	342	339	317	317	347	365	376	384	391	397	402
Operating lease payments	136	113	94	52	50	50	50	50	50	50	50
External IT services	129	141	166	174	285	287	291	296	301	306	311
Other services	567	617	616	648	728	732	743	756	769	782	795
Total cost of purchased services	7,896	7,942	7,731	7,804	8,637	8,565	8,826	9,045	9,243	9,424	9,585
Total Cost of Materials and Services	16,731	17,946	17,498	17,283	17,640	17,669	18,258	18,815	19,281	19,765	20,155

• STAFF

STAFF COST	Change							Assumption
	Unit	2016F	2017F	2018F	2019F	2020F	2021F	
Wages and salaries	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Social security contributions	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Expenses for pension plans and other employee benefits	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
PAG Staff cost	%	57.11%	57.11%	57.11%	57.11%	57.11%	57.11%	Percentage of total Staff cost
Logistics Staff cost	%	5.23%	5.23%	5.23%	5.23%	5.23%	5.23%	Percentage of total Staff cost
MRO Staff cost	%	16.75%	16.75%	16.75%	16.75%	16.75%	16.75%	Percentage of total Staff cost
Catering Staff cost	%	13.01%	13.01%	13.01%	13.01%	13.01%	13.01%	Percentage of total Staff cost
Other Staff cost	%	5.90%	5.90%	5.90%	5.90%	5.90%	5.90%	Percentage of total Staff cost

in €m

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Wages and salaries	5,380	5,734	5,878	5,904	6,353	6,391	6,487	6,597	6,709	6,823	6,939
Social security contributions	766	791	801	810	854	859	872	887	902	917	933
Expenses for pension plans and other employee benefits	532	216	677	621	868	868	868	868	868	868	868
Total Staff Cost	6,678	6,741	7,356	7,335	8,075	8,118	8,227	8,352	8,479	8,609	8,740

• CAPEX

CAPEX	Change							Assumption
	Unit	2016F	2017F	2018F	2019F	2020F	2021F	
Aircraft overhaul and equipment	%							In line with Aircraft and Reserve Engines
Property, plant and equipment	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Intangible assets	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Equal to 2015 nominal value
Financial investments	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
PAG Capex	%	79.79%	79.79%	79.79%	79.79%	79.79%	79.79%	Percentage of total Capex
Logistics Capex	%	8.34%	8.34%	8.34%	8.34%	8.34%	8.34%	Percentage of total Capex
MRO Capex	%	5.27%	5.27%	5.27%	5.27%	5.27%	5.27%	Percentage of total Capex
Catering Capex	%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	Percentage of total Capex
Other Capex	%	0.87%	0.87%	0.87%	0.87%	0.87%	0.87%	Percentage of total Capex

in €m

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Primary investments											
Aircraft overhaul and equipment	2,045	1,966	2,101	2,289	1,999	2,439	2,543	2,637	2,719	2,788	2,841
Secondary investments											
Property, plant and equipment	265	244	249	303	344	344	344	344	344	344	344
Intangible assets	135	79	94	107	111	111	111	111	111	111	111
Financial investments											
Financial investments	115	67	55	78	115	116	117	119	121	124	126
Capex (excluding financial investments)	2,445	2,289	2,444	2,699	2,454	2,894	2,998	3,092	3,174	3,243	3,296
Total Capex	2,560	2,356	2,499	2,777	2,569	3,009	3,115	3,212	3,296	3,366	3,422

- **D&A**

D&A	Change							Assumption
	Unit	2016F	2017F	2018F	2019F	2020F	2021F	
PAG D&A	%	78.11%	78.11%	78.11%	78.11%	78.11%	78.11%	Percentage of total D&A
Logistics D&A	%	4.51%	4.51%	4.51%	4.51%	4.51%	4.51%	Percentage of total D&A
MRO D&A	%	5.68%	5.68%	5.68%	5.68%	5.68%	5.68%	Percentage of total D&A
Catering D&A	%	4.05%	4.05%	4.05%	4.05%	4.05%	4.05%	Percentage of total D&A
Other D&A	%	3.62%	3.62%	3.62%	3.62%	3.62%	3.62%	Percentage of total D&A

in €m

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Intangible Assets with an indefinite useful life including goodwill and other intangible assets	1,575	1,568	1,569	1,587	1,657	1,768	1,879	1,990	2,101	2,212	2,323
Aircraft and reserve engines	11,592	11,838	12,359	13,572	14,591	15,685	16,783	17,874	18,947	19,989	20,988
Property, plant and other equipment	2,118	2,081	2,059	2,109	2,173	2,317	2,447	2,566	2,674	2,771	2,860
Long Term Investments	1,426	832	961	1,231	736	857	978	1,099	1,220	1,341	1,462

Depreciation, amortisation and impairment	-1,722	-1,839	-1,767	-1,528	-1,715	-1,765	-1,900	-2,035	-2,168	-2,298	-2,424
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Percentage of Depreciation, amortisation and impairment	10.3%	11.3%	10.4%	8.3%	9.0%
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Prior 3 year average	9.2%
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- **OPERATING INCOME / EXPENSE**

OTHER OPERATING INCOME/EXPENSE	Change							Assumption
	Unit	2016F	2017F	2018F	2019F	2020F	2021F	
Other operating income	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
Other operating expenses	%	0.60%	1.50%	1.70%	1.70%	1.70%	1.70%	Expected inflation rate
PAG Other operating income	%	47.73%	47.73%	47.73%	47.73%	47.73%	47.73%	Percentage of total Other operating income
Logistics Other operating income	%	3.41%	3.41%	3.41%	3.41%	3.41%	3.41%	Percentage of total Other operating income
MRO Other operating income	%	10.30%	10.30%	10.30%	10.30%	10.30%	10.30%	Percentage of total Other operating income
Catering Other operating income	%	3.43%	3.43%	3.43%	3.43%	3.43%	3.43%	Percentage of total Other operating income
Other segment - Other operating income	%	59.42%	59.42%	59.42%	59.42%	59.42%	59.42%	Percentage of total Other operating income
PAG Other operating expenses	%	61.30%	61.30%	61.30%	61.30%	61.30%	61.30%	Percentage of total Other operating expenses
Logistics Other operating expenses	%	5.36%	5.36%	5.36%	5.36%	5.36%	5.36%	Percentage of total Other operating expenses
MRO Other operating expenses	%	13.60%	13.60%	13.60%	13.60%	13.60%	13.60%	Percentage of total Other operating expenses
Catering Other operating expenses	%	8.34%	8.34%	8.34%	8.34%	8.34%	8.34%	Percentage of total Other operating expenses
Other segment - Other operating income	%	24.87%	24.87%	24.87%	24.87%	24.87%	24.87%	Percentage of total Other operating expenses

in €m

Years	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F
Other operating income	2,324	2,785	2,043	1,890	2,832	2,849	2,892	2,941	2,991	3,042	3,093
Other operating expenses	-5,293	-4,885	-4,756	-5,088	-6,106	-6,143	-6,235	-6,341	-6,449	-6,558	-6,670

Appendix 15: Discounted Cash Flow

Years	2016F	2017F	2018F	2019F	2020F	2021F	Description
Risk free rate (RF)	1.20%	1.20%	1.20%	1.20%	1.20%	1.20%	5 year average Euro zone 10 year AAA government bonds
Country risk premium (CRP)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Aswath Damodaran's calculations as in February 11 2016
Market risk premium (MRP)	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	Aswath Damodaran's calculations as in February 11 2016
Beta levered	1.24	1.24	1.24	1.24	1.24	1.24	Aswath Damodaran's calculations as in January 5 2016 and author
Cost of equity (ke)	8.93%	8.93%	8.93%	8.93%	8.93%	8.93%	$Ke = RF + \beta * MRP$
Cost of debt (kd)	2.79%	3.17%	2.98%	3.19%	3.01%	3.20%	Interest expenses divided by debt
Marginal tax rate (T)	25.00%	25.00%	25.00%	25.00%	25.00%	25.00%	Company data
After-tax cost of debt	2.09%	2.37%	2.23%	2.39%	2.26%	2.40%	After-tax cost of debt = $Kd * (1-T)$
Weight of equity	42.34%	45.31%	46.19%	48.38%	48.72%	50.29%	Company estimates
Weight of debt	57.66%	54.69%	53.81%	51.62%	51.28%	49.71%	Company estimates
WACC	5.0%	5.3%	5.3%	5.6%	5.5%	5.7%	$WACC = ke * [E/(E+D)] + kd * [D/(E+D)] * (1-T)$

Years	2016F	2017F	2018F	2019F	2020F	2021F
EBIT(1-Marginal tax rate)	1,527	1,623	1,599	1,583	1,499	1,430
D&A	1,765	1,900	2,035	2,168	2,298	2,424
Net increase in NWC	87	-40	-33	-30	-27	-24
Capex	3,009	3,115	3,212	3,296	3,366	3,422
FCFF	196	448	455	485	458	457
Discounted FCFF	196	425	410	412	370	346
Cumulative discounted FCFF	196	621	1,031	1,443	1,813	2,159
Terminal Value	8,983	9,431	9,935	10,465	11,046	11,655

Growth rate	1.70%
Perpetuity WACC	5.7%

PV of terminal Value	8,983.11
NPV of FCFF	2,159.08
Enterprise Value	11,142.20 €

Net debt	4,417.90
Value of equity	6,724.29
Number of shares outstanding	466.15
Price at the end of 2016	14.43 €

37.51% Upside Potential

Current price	10.49 €
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Appendix 16: Peer Selection

For the multiples valuation, we focused on finding the most similar airline groups in terms of dimension, structure and risk. For this, we have taken an initial sample of 8 companies from the top 50 airline groups. These companies have already been mentioned in the competitive analysis. They are:

Air France-KLM (France), IAG (UK), Turkish Airlines (Turkey), Aeroflot (Russia), Easyjet (UK), Ryanair (Ireland), American Airlines Group (USA), and Delta Air Lines (USA).

In terms of **dimension**, we tested for Total revenues, Total Assets and Total Fleet.

- (1) For **Total Revenues**, we considered only those with at least 15,000 of revenues. To calculate the mean, we have taken into account the last 5 years.
- (2) For **Total Assets**, it was used the same methodology than in total revenues, we considered only those with at least 15,000 of assets. To calculate the mean, we have taken into account the last 5 years.
- (3) For **Total fleet**, we considered only those with at least 300 aircrafts in the current year.

In Terms of **structure**, we tested for the percentage of Passenger airline share.

- (4) For **Passenger airline** share we considered only those with at least 70% of share.

In term of **risk**, we tested for the levered Beta.

- (5) For **Beta**, we considered only those with beta between 0.5 and 1.5.

Beta	Beta	Peer?
Deutsche Lufthansa	1.24	
Air France-KLM	1.21	Yes
IAG	1.84	No
Turkish Airlines	1.12	Yes
Aeroflot	1.16	Yes
EasyJet	0.94	Yes
Ryanair	0.98	Yes
American Airlines	2.43	No
Delta Air Lines	1.05	Yes

Total revenue	Mean	Peer?
Deutsche Lufthansa	30,192.60	
Air France-KLM	25,490.25	Yes
IAG	19,163.40	Yes
Turkish Airlines	7,362.86	No
Aeroflot	5,925.48	No
EasyJet	5,114.14	No
Ryanair	4,718.78	No
American Airlines	25,166.40	Yes
Delta Air Lines	24,751.60	Yes

Total Assets	Mean	Peer?
Deutsche Lufthansa	29,736.80	
Air France-KLM	25,066.40	Yes
IAG	22,154.60	Yes
Turkish Airlines	9,930.60	No
Aeroflot	4,283.36	No
EasyJet	5,633.70	No
Ryanair	9,507.40	No
American Airlines	29,462.80	Yes
Delta Air Lines	39,790.40	Yes

Total Fleet	# Planes	Peer?
Deutsche Lufthansa	600	
Air France-KLM	534	Yes
IAG	529	Yes
Turkish Airlines	330	Yes
Aeroflot	162	No
EasyJet	230	No
Ryanair	315	Yes
American Airlines	1,533	Yes
Delta Air Lines	926	Yes

Structure	PA Share	Peer?
Deutsche Lufthansa	74.30%	
Air France-KLM	74.30%	Yes
IAG	88.40%	Yes
Turkish Airlines	89.10%	Yes
Aeroflot	84.00%	Yes
EasyJet	98.60%	Yes
Ryanair	75.30%	Yes
American Airlines	87.00%	Yes
Delta Air Lines	86.60%	Yes

Finally, to be considered a peer, we have considered only those with the maximum of one “No”.

Peer Selection	Total Revenue	Total Assets	Fleet	PA Share	Beta	Peer?
Air France-KLM	Yes	Yes	Yes	Yes	Yes	Yes
IAG	Yes	Yes	Yes	Yes	No	Yes
Turkish Airlines	No	No	Yes	Yes	Yes	No
Aeroflot	No	No	No	Yes	Yes	No
EasyJet	No	No	No	Yes	Yes	No
Ryanair	No	No	Yes	Yes	Yes	No
American Airlines	Yes	Yes	Yes	Yes	No	Yes
Delta Air Lines	Yes	Yes	Yes	Yes	Yes	Yes

We conclude that our peer group consists of 4 companies, which represents half of the initial sample. They are:

Air France-KLM (France), **IAG** (UK), **American Airlines Group** (USA), and **Delta Air Lines** (USA).

Appendix 17: Peers Strategies

International Airlines Group (IAG)

- Leadership in the company main cities: London, Barcelona, Madrid, Dublin and Rome;
- Leadership across the Atlantic by providing the most comprehensive frequency and network proposition in collaboration with the oneworld partners American airlines and LATAM airlines group;
- Stronger the Europe-to-Asia position in critical markets.

Air France-KLM

- A Product and service targeting the highest international standards;
- Develop in growth markets: long-haul, intra-European low-cost, aeronautics maintenance;
- An on-going improvement in productivity and efficiency within the framework of strict capacity and capex discipline.

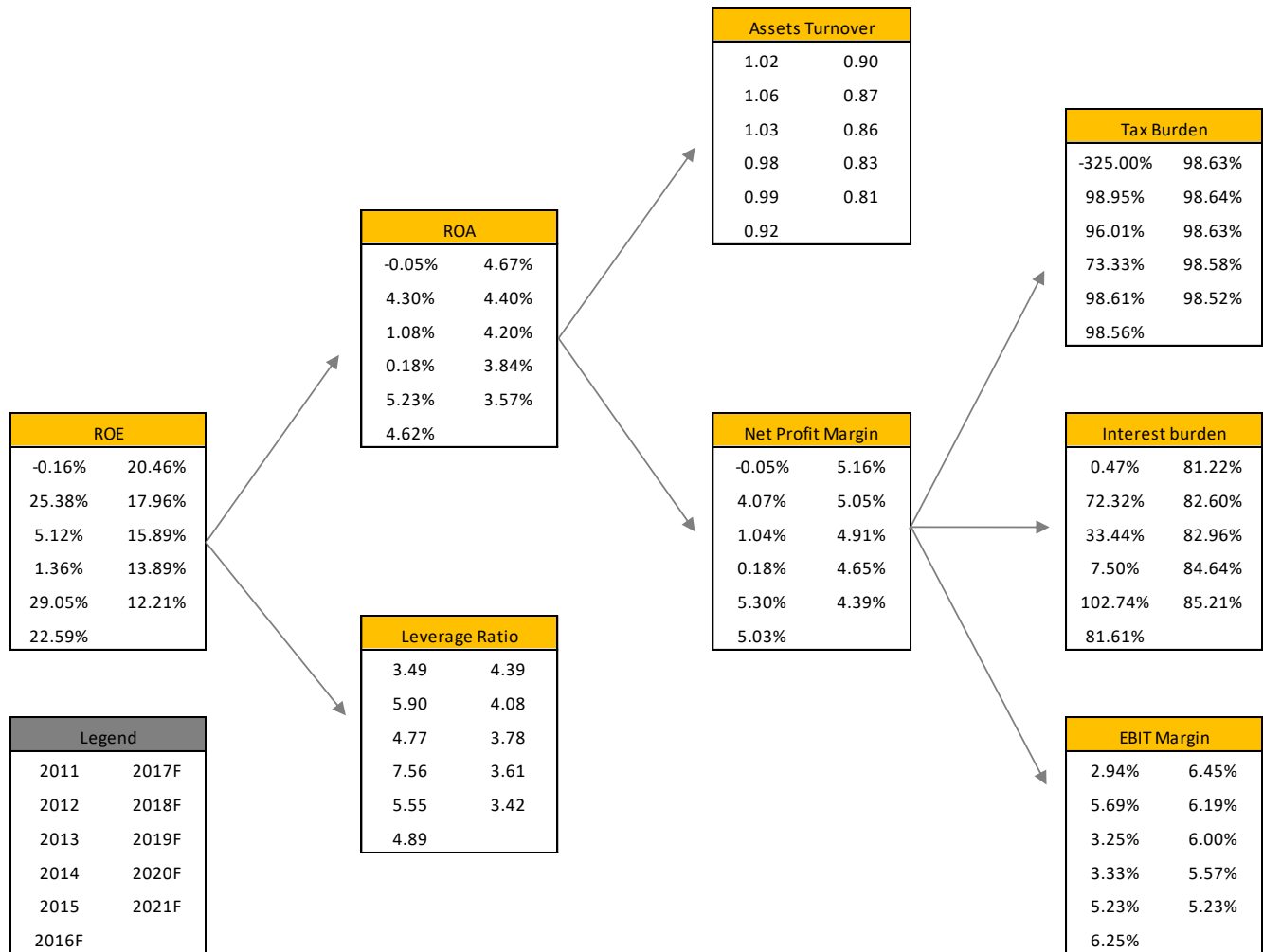
American Airlines

- Invest in new aircraft, the company expects to have one of the youngest fleets in the industry;
- Invest in the company products to increase the customer experience such as upgrading the Aircraft cabins and Airport kiosks and admiral clubs.

Delta Air Lines

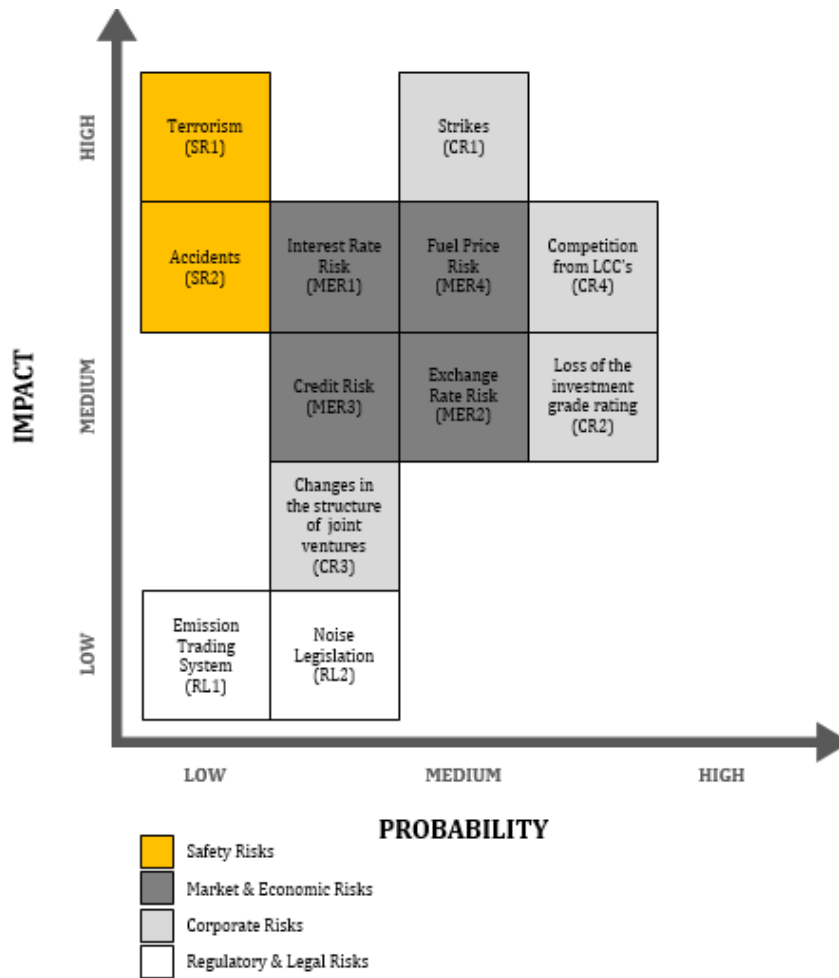
- Make targeted network investments such as investments in the most promising geographic growths with strong aligned partners;
- Upgrade the fleet for efficient domestic growth in order to capture seat cost efficiency and enhance the customer experience;
- Expand ancillary revenue through a tailored customer experience.

Appendix 18: Return on Equity



Formulas	
ROA	Net Income / Total Assets
Leverage Ratio	Assets / Equity
Assets Turnover	Sales / Assets
Net Profit Margin	Net Income / Sales
Tax Burden	Net Income / EBT
Interest Burden	EBT / EBIT
EBIT Margin	EBT / Sales

Appendix 19: Risk Matrix



Appendix 20: Risks to Price Target

Monte Carlo Base Assumptions

Source: Author

Variable	Mean	Std.Dev	Distribution	Assumption
Terminal growth	1.70%	0.15%	Normal	Checks the sensitivity change of terminal growth on the price target
Aircraft Fuel and lubricants	22.84%	0.50%	Normal	Checks the sensitivity change of Aircraft fuel and lubricants on the price target
Staff cost	1.70%	0.50%	Normal	Checks the sensitivity change of staff cost on the price target
Fees and charges	21.75%	0.30%	Normal	Checks the sensitivity change of fees and charges on the price target

We applied the BPI's investment rating and risk classification. Due to the investment risks already mentioned and the hedging policy, we identify LHA as a medium risk company in the BPI's investment rating and risk classification table.

BPI investment Grading and Risk Classification
Source: BPI

	Low Risk	Medium Risk	High Risk
Buy	> 15%	> 20%	> 30%
Neutral	> 5% and < 15%	> 10% and < 20%	> 15% and < 30%
Reduce	> -10% and < 5%	> -10% and < 10%	> -10% and < 15%
Sell	< -10%	< -10%	< -10%

Change in percentage of Aircraft Fuel and lubricants												
Change in staff cost	14.43 €	22.34%	22.44%	22.54%	22.64%	22.74%	22.84%	22.94%	23.04%	23.14%	23.24%	23.34%
	1.40%	19.63 €	18.72 €	17.81 €	16.90 €	15.99 €	15.08 €	14.16 €	13.24 €	12.32 €	11.39 €	10.46 €
	1.50%	19.41 €	18.51 €	17.60 €	16.69 €	15.78 €	14.86 €	13.94 €	13.02 €	12.10 €	11.17 €	10.24 €
	1.60%	19.20 €	18.29 €	17.38 €	16.47 €	15.56 €	14.64 €	13.72 €	12.80 €	11.88 €	10.95 €	10.02 €
	1.70%	18.98 €	18.08 €	17.17 €	16.26 €	15.34 €	14.43 €	13.51 €	12.58 €	11.66 €	10.73 €	9.80 €
	1.80%	18.77 €	17.86 €	16.95 €	16.04 €	15.12 €	14.21 €	13.29 €	12.36 €	11.44 €	10.51 €	9.58 €
	1.90%	18.55 €	17.65 €	16.74 €	15.82 €	14.91 €	13.99 €	13.07 €	12.15 €	11.22 €	10.29 €	9.36 €
	2.00%	18.34 €	17.43 €	16.52 €	15.61 €	14.69 €	13.77 €	12.85 €	11.93 €	11.00 €	10.07 €	9.14 €

Change in Terminal growth rate												
Change in CRP	14.43 €	1.45%	1.50%	1.55%	1.60%	1.65%	1.70%	1.75%	1.80%	1.85%	1.90%	1.95%
	0.00%	13.24 €	13.47 €	13.70 €	13.94 €	14.18 €	14.43 €	14.68 €	14.94 €	15.21 €	15.48 €	15.77 €
	0.50%	12.22 €	12.42 €	12.63 €	12.84 €	13.05 €	13.27 €	13.50 €	13.73 €	13.97 €	14.21 €	14.46 €
	1.00%	11.31 €	11.49 €	11.67 €	11.86 €	12.05 €	12.25 €	12.45 €	12.66 €	12.87 €	13.08 €	13.30 €
	1.50%	10.48 €	10.65 €	10.81 €	10.98 €	11.16 €	11.33 €	11.51 €	11.70 €	11.89 €	12.08 €	12.28 €
	2.00%	9.74 €	9.89 €	10.04 €	10.19 €	10.35 €	10.51 €	10.67 €	10.84 €	11.01 €	11.18 €	11.36 €
	2.50%	9.06 €	9.19 €	9.33 €	9.47 €	9.62 €	9.76 €	9.91 €	10.06 €	10.21 €	10.37 €	10.53 €
	3.00%	8.44 €	8.56 €	8.69 €	8.82 €	8.95 €	9.08 €	9.22 €	9.36 €	9.50 €	9.64 €	9.78 €

Change in Fees and Charges												
Change in MRP	14.43 €	21.82%	21.92%	22.02%	22.12%	22.22%	22.32%	22.42%	22.52%	22.62%	22.72%	22.82%
	5.65%	21.44 €	20.45 €	19.45 €	18.45 €	17.44 €	16.43 €	15.42 €	14.41 €	13.39 €	12.37 €	11.35 €
	5.85%	20.57 €	19.61 €	18.64 €	17.67 €	16.69 €	15.72 €	14.74 €	13.76 €	12.77 €	11.79 €	10.80 €
	6.05%	19.75 €	18.82 €	17.88 €	16.94 €	16.00 €	15.05 €	14.10 €	13.15 €	12.20 €	11.24 €	10.28 €
	6.25%	18.98 €	18.08 €	17.17 €	16.26 €	15.34 €	14.43 €	13.51 €	12.58 €	11.66 €	10.73 €	9.80 €
	6.45%	18.26 €	17.38 €	16.50 €	15.61 €	14.73 €	13.84 €	12.94 €	12.05 €	11.15 €	10.25 €	9.35 €
	6.65%	17.58 €	16.73 €	15.87 €	15.01 €	14.15 €	13.28 €	12.42 €	11.55 €	10.67 €	9.80 €	8.92 €
	6.85%	16.94 €	16.11 €	15.28 €	14.44 €	13.60 €	12.76 €	11.92 €	11.07 €	10.22 €	9.37 €	8.52 €

Change in Perpetuity WACC												
	14.43 €	5.20%	5.30%	5.40%	5.50%	5.60%	5.69%	5.80%	5.90%	6.00%	6.10%	6.20%
Price	17.10 €	16.49 €	15.91 €	15.37 €	14.85 €	14.43 €	13.89 €	13.44 €	13.02 €	12.61 €	12.22 €	
Change (%)		18.54%	14.31%	10.31%	6.53%	2.93%		-3.73%	-6.82%	-9.77%	-12.58%	-15.27%

Due to the large amount of BUY regions (green regions), together with the outputs from the Monte Carlo simulation, we can conclude that our BUY recommendation is the most suitable for this company.

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Abbreviations

€m	Millions of euros
ACRO	Aircraft Crashes Record Office
APV	Adjusted Present Value
ASK	Available Seat Kilometer
BMI	British Midland International
BV	Book Value
CAPA	Centre for Asia Pacific
CAPEX	Capital Expenditure
CFF	Cash Flow from Financing Activities
CFI	Cash Flow from Investing
CFO	Cash Flow from Operations
CHF	Swiss Franc
CMS	Cost of Materials and Services
CNY	Chinese Yuan Renminbi
CRP	Country Risk Premium
D&A	Depreciations & Amortizations
DCF	Discounted Cash Flow
DDM	Dividend Discount Model
Dpo	Days Payables Outstanding
Dso	Days Sales Outstanding
EBIT	Earnings before Interest and Taxes
EBITDA	Earnings before Interest, Taxes, Depreciations and Amortizations
ECB	European Central Bank
EPS	Earnings per share
EV	Enterprise Value
FCFE	Free Cash Flow to Equity
FCFF	Free Cash Flow to the Firm
FSC's	Full Service Carriers
g	Perpetual growth rate
GBP	Great British Pound

GDP	Gross Domestic Product
GGM	Gordon Growth Model
IAG	International Airline Group
IATA	International Air Transport Association
ICAO	International civil Aviation organization
IMF	International monetary Fund
JPY	Japanese Yen
Kd	Cost of debt
Ke	Cost of Equity
KLM	Koninklijke Luchtvaart Maatschappij (Royal Dutch Airlines)
Ku	Unlevered Cost of Equity
LCC's	Low Cost Carriers
LHA	Deutsche Lufthansa AG
MRO	Maintenance, repair and overhaul
MRP	Market Risk premium
NWC	Net Working Capital
OAG	Official Airline Guide
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of the petroleum Exporting countries
P/E	Price-to-earnings ratio
PLF	Passenger Load Factor
PwC	PricewaterhouseCoopers
Rf	Risk Free
ROA	Return on Assets
ROCE	Return on Capital Employed
ROE	Return on Equity
RPK	Revenue Passenger Kilometer
T	Tax rate
TAROM	Romanian Air Transport
TV	Terminal Value
USD	United States Dollar
WACC	Weighted Average Cost of Capital