



Leasing and profitability: Empirical evidence from the airline industry[☆]



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ABSTRACT

In this paper, we empirically measure the impact of aircraft leasing choices on airlines financial performance. We use public data on 73 airlines operating worldwide over the period 1996–2011. In estimating the impact of leasing on profitability, we control for potential endogeneity by applying robust instrumental variables estimation, while introducing a set of individual and macroeconomic factors. Our results are threefold. First, we identify a non-monotonic and concave effect of leasing on an airline's profit margin, suggesting decreasing marginal returns to leasing in this sector. This is an original finding for the industry. We also derive a confidence interval for the optimal level of leasing. Second, we show that the impact of leasing on an airline's operating profit is stronger for Low Cost Carriers than for Full Cost Carriers: deviating from the optimal level of leasing might be more harmful for a LCC than for a legacy carrier. Finally, we analyze how an airline's experience affects the relationship between leasing and profitability.

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1. Introduction

Airlines' strategies are mainly driven by decisions on their network, products, prices and resources (specifically their fleet). As aircraft represent a long lifetime asset (25 years or more) and require a high investment, decisions on the fleet composition are the most engaging ones. Operating leases, as opposed to financial leases or ownership, allow airlines to recover some flexibility when making these fleet decisions.¹ Indeed, a leased aircraft can be operated for a period lower than its useful life, with limited upfront capital requirement. With operating leases, unlike financial (or capital) leases, the ownership risks and rewards remain with the lessor² and the assets are off the lessee's balance sheet. Typical operating and financial leases in the

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¹ The typical contract length is around 6 years for operating leases and around 15 years for financial leases. See [Gavazza \(2010\)](#), [Vasigh et al. \(2015\)](#) and [Oum et al. \(2000\)](#).

² The criteria to classify leases as operating or financial are discussed in the IAS 17 and FAS13/ASC840 accounting standards. Typically, a lease is classified as a financial lease if: (i) it runs for the major part of the asset life (75% for FAS); or (ii) the total lease payments represent essentially all of (more than 90% for FAS) the value of the asset; or (iii) there is a bargain or automatic purchase option at the end of the lease. Any other leases are considered as operating leases. This distinction will vanish with the implementation of the IFRS16 on January 1st, 2019 which will force lessees to recognise assets and liabilities for all leases, i.e. consider all leases as financial leases.

airline industry are called 'dry' leases because the lessee only rents the aircraft, as opposed to 'wet' leases where also the crew, maintenance and insurance are rented.³ The lessor community has long argued that leasing has tangible benefits for airlines. Dick Forsberg, from the Irish lessor Avolon, summarizes the key strengths of lessors in three points: "They provide liquidity to weaker credits, make metal available from their order books when manufacturers have sold out, and give airlines flexibility in terms of their financing mix."⁴ This may explain why operating leasing has become an essential means of accessing capacity for the airline industry. According to Boeing and Centre for Aviation, the proportion of leased aircraft worldwide went from 0.5% in 1970 to 40% in 2015 and 50% of Airbus' 2015 deliveries are financed by lessors.

In this paper, we analyze whether operating leasing with its above-mentioned advantages truly allows airlines to improve their financial performance.

Indeed, while aircraft lessors are thriving,⁵ the financial performance of the airline industry as a whole has remained relatively low for decades. A McKinsey analysis published by *IATA Economics Briefings (2013)* shows that airlines have exhibited the worst average Return on Invested Capital (ROIC) over the 1965–2007 period compared to all other industries. However, even if the financial performance of the airline industry as a whole has been below average, *Fig. 1* documents that a few airlines have been successful and profitable. Moreover, it is worth noticing that they have achieved those profits while pursuing different leasing strategies.

Despite this puzzling anecdotal evidence, the literature has only examined the determinants of airlines leasing choices through their impact on economic efficiency.⁶ Our objective in this paper is to tackle this issue by analyzing the impact of leasing on airlines' operating profit margin.

For our empirical analysis we collect data including airlines' financial information (revenues, operating profits, rental expenses and fixed assets), as well as additional financial and macroeconomic data. Our sample covers approximately 75% of the total industry revenues for the period 1996–2011.

We characterize the impact of leasing, among other macroeconomics and business factors, on the operating profit margin using a Two Stage Least Squares (2SLS) regression with instrumental variables. This allows us to take into account the endogeneity that could result from the influence of an airline's profits on its leasing decisions, and some potential unobserved heterogeneity between airlines.

Estimating an airline's financial performance based on a reduced form equation is the result of a compromise between research objectives, data availability and estimation method. It is worth noticing that our main objective is to identify the impact of leasing on an airline's profitability, rather than to predict profitability. In that respect, we believe that our approach provides meaningful and robust results.

The major findings of our paper are the following. First, we identify a non-monotonic and concave relationship between leasing and profit margin. This allows us to determine the optimal level of leasing which maximizes the operating margin: 53.4%, and the corresponding confidence interval. This result is in line with the industry statistics presented in the first paragraph. Moreover, the concave effect we find indicates that airlines face decreasing marginal returns to capital investment in operating lease on their profit margin. The marginal benefits of leasing are thus higher for companies with lower leasing ratio. This is consistent with the accounting and finance literature that characterizes diminishing marginal returns to investment.⁷ Intuitively, firms have incentives to first undertake the most profitable investment opportunities before less profitable ones. However, while this literature documents a non-increasing relationship between operating performance and capital investment (and consequently operating leasing), we show that the relationship between those variables is non-monotonic.

Second, we show that the impact of leasing on an airline's operating margin depends on its business model. We characterize similar patterns (i.e. diminishing marginal returns to leasing and a non-monotonic and concave impact of leasing) for both Low Cost Carriers (LCCs) and Full Cost Carriers (FCCs). However, the magnitude of this impact is significantly different for both groups. We show that the benefits of leasing are more important for LCCs than for FCCs and that diminishing marginal returns to leasing are less pronounced for the latter category. Intuitively, as the aircraft expenses represent a higher proportion of LCCs' cost base and, as leasing allows airlines to gain flexibility in their capacity, the impact of leasing is stronger for LCCs. The consequences of a deviation from the optimal level of leasing are therefore more harmful for a LCC than for a FCC. Our model also allows us to characterize the airlines that could enhance their operating margin by choosing an optimal level of leasing. This may help airlines and lessors to refine their strategy and investors to assess which airlines have the highest chances to succeed.

Third, we analyze the effect of the combination of an airline's leasing strategy with its experience. Leasing is more profitable for younger airlines than for long-established ones. Indeed, established airlines are less dependent on their leasing strategy as their experience allows them to better adapt their behavior to changes in the economic framework.⁸ Also, established airlines may own a greater absolute number of aircraft or variety of aircraft types than younger airlines, allowing for more

³ For more details on leasing strategies, see *Mancilla (2010)* or *Vasigh et al. (2015)*. Notice that 'wet' leases are much less frequently used than 'dry' leases.

⁴ In *Air Transport: Aviation International News*, 2012.

⁵ For instance, Ireland based Avolon has been recently acquired by China's HNA group for \$7.6 billion.

⁶ An exception is *Oum et al. (2000)*. We discuss their results in the literature review.

⁷ Previous studies have shown that an increase in the invested capital (which partly come from operating leases activities in the airline industry) tends to make future firm performance lower. *Abarbanell and Bushee (1998)*, *Fairfield et al. (2003)* and *Titman et al. (2004)* have documented that when firms increase their capital expenditures, future earnings and operating performance decrease.

⁸ See *Ismail and Jenatabadi (2014)*.

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