

KEY POLICY ISSUE

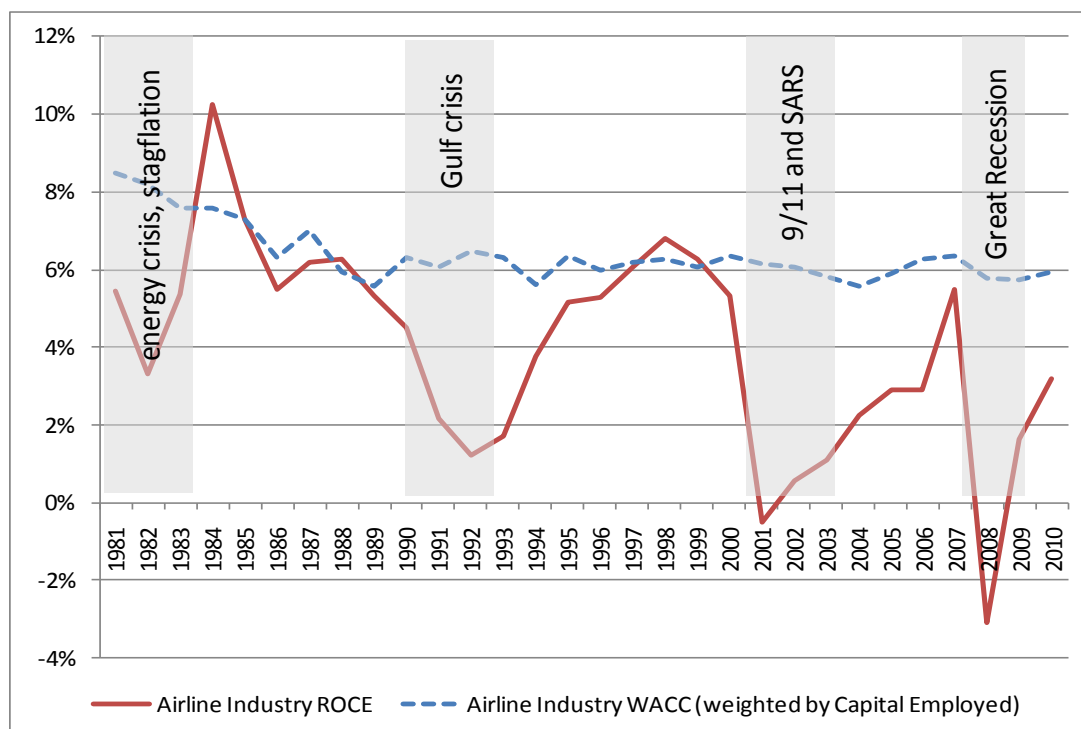
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EXPLAINING OVER-CAPACITY IN THE AIRLINE INDUSTRY¹

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It is a well-established fact that the airline industry suffers from insufficient profitability. Figure 1 compares the returns on capital employed (ROCE) and the weighted average cost of capital (WACC) for 69 public listed airlines worldwide, covering roughly 70% of the airline industry.

Figure 1 – Airline profitability



Source: Own calculation based on data from Thomson Financial

Since 1981, the listed airline industry earned meaningful economic profits only in 1984. For a further five years, the industry approximately covered its cost of capital (1985, 1988, 1997, 1998 and 1999). During the remaining years, and since 2000, the industry has failed to cover its cost of capital.

¹ This article draws heavily from the authors' recent research paper entitled "Why does the airline industry over-invest?" published in the Journal of Air Transport Management (2012) 19: 1-8.

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This is difficult to reconcile with another feature of the airline industry, namely the continuous expansion of capacity. Only in the most severely affected markets has there been a moderate cut in capacity, for example aircraft-seats of the US airline passenger fleet have declined by 1.4% per year between 2001 and 2008. Even during the Great Recession in 2009, the aircraft fleet worldwide expanded by 1%, so the industry is adjusting to recessions not by shedding capacity but by underutilizing a still growing fleet.

This raises two questions: first, why have capital markets continued to provide the resources for further expansion of the industry, and second, why have airline managers made use of these resources in order to grow in a market that does not provide sufficient returns? We examine and empirically test four possible explanations for over-investment.

Principal-agent problems

For public listed companies, ownership and control are separated. Principal-agent problems can thus explain investment decisions by managers that diverge from the interests of shareholders.

For example, managers could engage in empire building and invest without proper consideration of the net present value of incremental projects, but rather with the purpose of increasing the resources under their control, increasing their compensation and supplying new positions to allow internal promotion of middle managers. The agency problem of empire building arises if managers have free cash flow to finance negative net present value projects. High depreciation charges combined with a scarcity of positive net present value projects indicate that the airline industry might be prone to empire building.

Empire building could also be an issue if airlines have no free cash flows, but ample access to debt financing such that managers can bypass the control of shareholders. Liquid assets have a high debt capacity due to their value as collateral, and since aircraft are reasonably liquid, airlines can take on relatively large amounts of debt.

Moreover, other components of the air transport value chain are profitable and thus have an incentive to provide capital to airlines in order to increase the size of the overall industry and protect their own business. For anecdotal evidence, consider the fact that General Electric's Commercial Aviation Services, a large aircraft lessor, was quick to provide a short-term loan to United Airlines when it entered Chapter 11.

Barriers to exit

Over-capacity in the airline industry could be the result of relatively low barriers to entry coupled with high barriers to exit. Barriers to exit are established by sunk costs, i.e. fixed costs that are not recoverable in the case of exit. While aircraft are sometimes understood as capital on wings, i.e. highly mobile assets, this mobility is not perfect as part of the investment is specific to the airline, for example the livery and interior fittings.

Moreover, unprofitable airlines will want to cut capacity if economic conditions deteriorate, but this will have an impact on all airlines, depressing residual values and making part of the investment irreversible. Even if aircraft could be mothballed without costs or sold at book value, there are costs associated with termination payments to workers, costs for contract violations for leases of gates, hangars and office space, and the costs of abandoning valuable slots.

Even in the case of bankruptcy as a result of a war of attrition, capacity is not automatically forced out of the market or the distressed carrier. For example in the US under a Chapter 11 reorganization plan, bankrupt carriers may continue to operate as a going concern.

Barriers to exit in the airline industry are further raised due to uncertainty regarding future prices and demand conditions. In this case, an airline might continue to operate while incurring losses in excess of fixed costs. The intuition is that once a firm has invested in an aircraft, there is an option value (a “real option”) of keeping it in operation even if prices fall below variable costs. This is because mothballing the aircraft and resuming service at a later time is costly, and there is a chance that prices recover.

So if some parts of the airline industry, like low-cost carriers (LCCs) or Asian carriers, rationally expand capacity while others are unprofitable and rationally do not cut capacity, over-investment in the industry as a whole may result.

Economies of scale and network effects

Consider the manager of an airline that historically has not covered cost of capital. He might argue that further investments are still worthwhile because economies of scale, scope or density will improve the cost conditions of his airline to the extent that the additional investment has a positive net present value.

Alternatively, the airline manager might rationalize additional investments with demand side effects. For a hub-and-spoke network, a new destination to the hub will not only serve the local traffic on this route but will also feed connecting traffic into the remainder of the system and thus generate positive network effects as higher traffic density throughout the system not only lowers unit costs but also allows for more frequent flights, thus increasing the attractiveness to price inelastic business travelers.

At some point, these economies are exhausted, for example because the airline already operates large, cost-efficient aircraft, or because adding additional destinations to the hub becomes costly due to capacity constraints and congestion.

State influence

Even though our data set consists of publicly listed companies, 20 of the 69 airlines included are partly state-owned; with governments' shares averaging 52.4%. It can be conjectured that the state may follow an agenda that is motivated by considerations other than the economic success of the airline, for example the prestige of a having a large “flag” carrier, securing or creating jobs, the perceived positive externalities of aviation, the attempt to limit environmental damage by investing into a modern fleet and personal rent-seeking by politicians seeking membership on the board or the convenience of a dense network of the home carrier.

Under this line of reasoning, a larger stake of the government should coincide with over-investment.

Empirical results

Following the discussion above, we examine the relationship between investment as the dependent variable and profitability, business model (network or low-cost carrier), region, state ownership, director ownership and size as independent variables, applying pooled and fixed effects regressions to the unbalanced panel data set covering 69 airlines and roughly 1,000 firm-years of data.

The main results can be summarized as follows:³

- 1) Investments of an airline are only to a small part determined by profitability. This is surprising and in contradiction to standard economic theory whereby firms should only invest if the incremental capacity covers the cost of capital. But this is the crucial point: if investment decisions of airlines were mainly driven by profitability, there would be no over-investment.

³ For details and further sources please refer to the original research cited in footnote 1.

- 2) Barriers to exit play a significant role in explaining over-investment. Some segments of the airline industry, like LCCs or Asian carriers, invest up to twice as much as carriers of otherwise similar characteristics. This additional capacity does not coincide with a reduction of capacity in the remainder of the industry.
- 3) As the share of capital owned by management increases, over-investment is less likely to occur. Thus agency problems seem to contribute to over-investment.
- 4) Smaller carriers invest a larger share of sales than larger carriers. This supports the hypothesis that airlines invest in order to exploit economies of scale, and that these economies fade after the airline has achieved an efficient scale.
- 5) There is no evidence that state control contributes to over-investment.

The statistical results are presented in Table 1.

Table 1 – Relationship between gross capex/sales-ratio and airline characteristics

Independent variable	Predicted sign	Coefficient (t-statistic)
(ROCE-WACC) life	Positive	0.358** (2.41)
(ROCE-WACC) lag 1 year	Positive	0.068 (1.54)
(ROCC-WACC) lag 2 years	Positive	0.088** (2.21)
Low-cost carrier	Positive, if overinvestment is due to shift from network to LCC	0.083*** (5.62)
Region Asia	Positive, if overinvestment is due to shift to Asia	0.094*** (6.03)
Region EU		0.008 (0,44)
Region North America		0.033* (1,96)
% Owned by state	Positive, if overinvestment is due to state control	0.004 (0,15)
% Owned by directors	Negative, if overinvestment is due to agency problems	-0.089** (-2,03)
Size (Ln Sales)	Negative, if overinvestment is due to expected economies of scale	-0.010** (-2,22)
Degrees of freedom		802
Adjusted R square		0.116
F-statistic		11.569

*, **, *** indicates significance at the 10%, 5% and 1% levels.

Policy implications

Excess capacity and the resulting wars of attrition are undesirable for airlines and their owners, but they need not be unwelcome from a social point of view. Because wars of attrition in the airline industry occur through low prices, they redistribute rents from the airlines to the consumer. Welfare losses may only occur because some profits are dissipated wastefully through duplication of fixed costs, resulting in low

load factors. Still, this does not seem to warrant heavy-handed regulation with all associated shortcomings.

More severely, excess capacity and wars of attrition could lead to a deterioration of safety standards and operating performance, imposing additional costs on passengers. However, the technical operations of an airline are still highly regulated by transport authorities, so only if these rules prove to be inadequately enforceable for distressed airlines should economic regulation, for example capital adequacy requirements as in the banking sector, be considered.

Airlines can address the problems of over-investment in several ways. A closer alignment of the interests of owners and managers, for example through share ownership, stock options or compensation tied to economic profit, would limit over-investment due to agency problems. More flexible capacity limits the adverse effects of barriers to exit in the industry. For example, a higher share of shorter-term lease agreements for aircraft or gates, a higher share of temporary employment in non-critical functions and the ability to trade slots would facilitate the adjustment of capacity in a downturn.

Since a main benefit from cutting capacity for an airline is through less intense product market competition and a more favorable pricing environment, only a fraction of this benefit to the industry accrues to the unprofitable carrier. Thus a higher concentration of supply should limit excess capacity.

The views expressed in this article are the author's and not necessarily those of IATA.