# A Case Study

# 13

This chapter covers ...

- how to apply the theoretical insights from the last chapters in order to gain a better understanding of a specific market or industry.
- how legal, technological and economic aspects of an industry work hand in hand in determining the functioning of markets.
- how to interweave empirical facts with economic theory to thereby build a case.
- some facts about the Europan aviation industry.
- how all these facts influenced Swiss Air in the years before its grounding.

## 13.1 The Grounding of Swissair as a Case Study for the Use of Economic Theory

> Swissair's collapse this week stranded thousands of passengers world-wide; saw its planes blocked in London; and left fliers holding potentially worthless tickets. A widespread feeling in Switzerland is that the airline that was the national pride was finished off by the banks that embody its national character of reliable, no-nonsense business. Yet its undoing may have been something very un-Swiss: bad management. [...] The plunge in air traffic after the Sept. 11 terrorist attacks in the U.S. pushed Swissair over the edge, but it has been flirting with collapse for months. [...] The nightmare began as a grand plan for growth. Like scores of other companies from this small, land-locked country, Swissair grew into a global player. 'An inflexible regulatory environment and some poor investments' crippled Swissair, says Damien Horth, an airline analyst at ABN-Amro in London. 'Poor management by Swissair in terms of its acquisitions and not controlling its associates well' proved fatal. (The Wall Street Journal, October 02, 2001)

We have covered a lot of ground in the last chapters and one should, by now, have a decent understanding of the functioning of prototypical markets, how they contribute to welfare and their weaknesses. We have also devoted a lot of pages putting the theories into perspective and applying them toward getting a better understanding of the societal phenomena that are characteristic for today's societies. The case

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studies have been relatively short, however, and have been tailored to specific theories, or even to specific aspects of a theory. What is still missing is a case study of sufficient complexity that it allows one to bring different theories together and to discuss the adequacy of the different theories for gaining an understanding of complex economic and social issues.

This chapter is an attempt at filling this gap and at illustrating how economic theories can be used to analyze and to better understand developments in markets and industries. The case that I am analyzing is the spectacular grounding of Swissair, a former Swiss airline. In order to be able to do so, one has to combine insights from different chapters. As one will see, a narrow economic focus is not sufficient to get a grip on this case. Rather, one has to embed economic analysis into the integrative approach that is fostered in this book, in order to gain a better understanding of the different factors that contributed to the insolvency of this once proud airline. One will see that legal, political, managerial and cultural aspects played important roles in this case. However, this analysis will also mention the limitations of the theoretical framework that has been developed in this book. Some aspects of the aviation industry require more elaborate market models, and I will briefly show how one can use the theories presented in this book to address these issues and to develop the theories in the directions necessary to understand these more complex aspects.

The market structure of an industry reflects the technology of production, the size of the market, as well as the legal and regulatory framework in which the firms operate. Changes in any of these factors can trigger deep, structural changes that impact on the number of competitors in a market, as well as the way competition works. Some of the reasons for the grounding of Swissair cannot be understood, if one does not take these factors into consideration. In the following pages, I will briefly summarize the most important theoretical insights from the preceding chapters that are relevant for a better understanding of the airline industry and apply them to the Swissair case. They provide one with a toolkit that allows one to better understand some of the key factors that determine the functioning of the airline industry. If one is still familiar with them, one can skip this subchapter. However, there are some additional properties of the industry that have to be taken into consideration for a comprehensive understanding, which require more advanced theories and therefore have to be left out of consideration. The main purpose of the following case study is, therefore, twofold:

1. It should help one to see how economic theories can be used in order to better understand real-world phenomena, how to select the most adequate theories, and how to use one’s insights to gain an understanding of the case. The fact that one has to conduct a thought experiment under “laboratory conditions,” which leave out some important aspects of the problem, does not compromise this approach, but instead creates a relatively accessible foundation. Hence, one is not aiming to present a “full-scaled” report on the case, but rather a version that allows one to apply and restrict one’s attention to the theories that one has learned throughout the previous chapters.

2. It illustrates how economics, law and management can and should work hand in hand to better understand the logic of social phenomena. In the end, good political and managerial decisions become more likely, if they are built on such an integrative approach.

## 13.2 Some Facts About the Aviation Industry in Europe

On March 31, 2002, after 71 years of service, Swissair ceased operation. This was the official endpoint of an economic downturn that led a once major international airline into bankruptcy. The airline prospered well into the 1980s, when it was one of the five major airlines in Europe. It was known as the "Flying Bank," due to its financial stability, and it was considered a national icon in Switzerland. How is it possible that a “Flying Bank” can turn into a money burner within 20 years? Which factors contributed to the demise of this airline?

A major event like the grounding of an airline can never be traced back to only a few causal factors. Reality is messy and one should shy away from oversimplifications. An economic analysis of the European aviation industry sheds at least some light on the case and makes some of the aspects that contributed to the grounding more transparent. However, an economic analysis of the case only gets one so far. In the end, the interplay between legal, technological and institutional factors created an environment in which managers had to act and define strategies for their firms. This environment may have been relatively hostile towards an airline like Swissair, but there is no direct causal chain from the changing economic logic of the industry to the demise of Swissair.

After World War 2, air traffic increased rapidly and many airlines profited from the political regulation of the markets that created national, *de-facto*, monopolies. During the 1960ies and 1970ies, Swissair was considered one of the best airlines of the world and made huge profits. Things began to change in the 1980ies when the European Community started a process of liberalization of the community air transport market, to which the member states committed themselves in 1986, and that also became relevant for Switzerland. In order to create a single market for air transport, the EU liberalized its air transport sector in three stages, called “packages.” This process culminated in the third package, adopted in 1993 and extended in 1997. It introduced the freedom for any airline of a member state to provide services within the EU and the freedom to provide “cabotage,” the right for an airline of one member state to operate a route within another member state. This single market was extended to Norway, Iceland and Switzerland in the following years.

This process of liberalization gradually changed the market structure from a system of regionally partitioned monopolies into a system of interregional competition, leading to a period of “cutthroat” competition in a market with too many, too small airlines, i.e. a form of competition where it is clear that some firms will be forced to leave the market. The following analysis will show that it was clear from the onset that this change in the political regulation of the industry would eventually lead to a consolidation and concentration of airlines. Different airlines began from different starting positions in this process of predatory competition. The “Flying Bank” Swissair had a head start, because of its large asset holdings and huge liquidity. However, the fact that Switzerland rejected taking part in the European Economic Area in 1992 was a huge disservice to Swissair, because the emerging common airline market was, for that reason, not a level playing field. Here are a few examples of the obstacles that confronted them: Swissair planes were not allowed to take up passengers during intermediate landings in EEA countries and Swissair was not allowed to sell tickets for sections within EEA member countries.

## 13.3 Applying Economic Theory to Understand the Aviation Industry

Now, one can lay down some principles that govern optimal firm behavior in a monopolized aviation industry. One should focus one’s attention on two different technological characteristics that are of major importance: the technology-induced cost structure of an airline and the bundling problem that results from the network structure of the product. These factors influence the pricing strategies of the airlines and, thereby, its profits. The network of flights offered by an airline determines its portfolio of different products, which implies that all airlines offer a different product portfolio, even if there may be some routes for which they compete directly.

**Digression 40. Additional Aspects**
This analysis gives only a very broad concept about airline pricing. There are at least three additional aspects in reality that complicate pricing, but that also make pricing in this industry intellectually fascinating. (1) There is no spot market for flights, so demand for a specific flight drops more or less stochastically over time before the flight. This implies that there is no single price on such a “dynamic” market, but a time-dependent price function. Prices may vary over time, depending on load factors, and so on. (2) Each flight has a given capacity, which implies that the marginal costs of an additional passenger are very small before and very large after the capacity threshold is reached (one would have to change the aircraft). Hence, any cost-plus pricing rule would discriminate prices at this point. The resulting problem is known as *peak-load pricing* in the literature. (3) An airline offers a network of different connections, which implies that there are complementary, as well as substitutive, edges in each network and airlines also compete with respect to their network structures.

In order to be able to analyze the effect of liberalization on the industry, remember that the model of oligopolistic quantity setting (Cournot competition) includes the case of perfect competition (and thereby also Bertrand Competition) as a special case, with a perfectly elastic demand function. Hence, one can restrict one's attention to a short repetition of this model in order to be able to distill the main messages for the Swissair case.

### 13.3.1 Costs

Chapter 7 explained that a firm's total costs, $C(y)$, are the sum of fixed costs, $FC$, and variable costs, $VC(y)$, the last of which depend on the quantity produced, $y$. In the airline context, $y$ may be, for example, the number of passengers transported from $A$ to $B$ or the frequency of flights offered. Hence, one can describe the total costs as:

$$C(y) = VC(y) + FC.$$

One important characteristic of the aviation industry is the structure of the airlines' cost functions: fixed costs are a significant share of total costs because the logistic infrastructure is, at least in the short run, largely independent of the occupancy rate. Fixed costs do not influence the pricing policy of a firm, but are relevant for profits and for determining whether a firm stays in a market or has to exit it.

Fixed costs are, to a large degree, capacity costs: that is, the depreciation and financing costs of the aircraft fleet and its maintenance, the costs of the supporting infrastructure, as well as the costs of landing rights and the handling of passengers at airports (contracts are usually longer term).

An airline's variable costs, for a given flight, encompass gasoline, onboard services like free drinks and meals (if they exist), and so on. If one breaks down costs to a single passenger, not even gasoline costs are variable. Hence, depending on the level of aggregation, variable costs are relatively unimportant in this industry. This leads to the following observation: average total costs of a firm are:

$$AC(y) = \frac{C(y)}{y} = \frac{VC(y)}{y} + \frac{FC}{y}.$$

Average costs are decreasing over a given range when $y$ is small and, depending on the structure of the variable costs, they might even be decreasing for all $y$. In order to see this, note that $VC(0) = 0$ by definition. Because fixed costs are large, average costs decrease over a significant range of $y$ and decrease over the whole range (for all $y$), if marginal costs are constant or decreasing. Assume, for simplicity, that variable costs are linear,

$$VC(y) = c \cdot y, \qquad c > 0,$$

which implies that marginal costs are constant and equal to $c$. Hence, the average-costs function is:

$$AC(y) = c + \frac{FC}{y}.$$

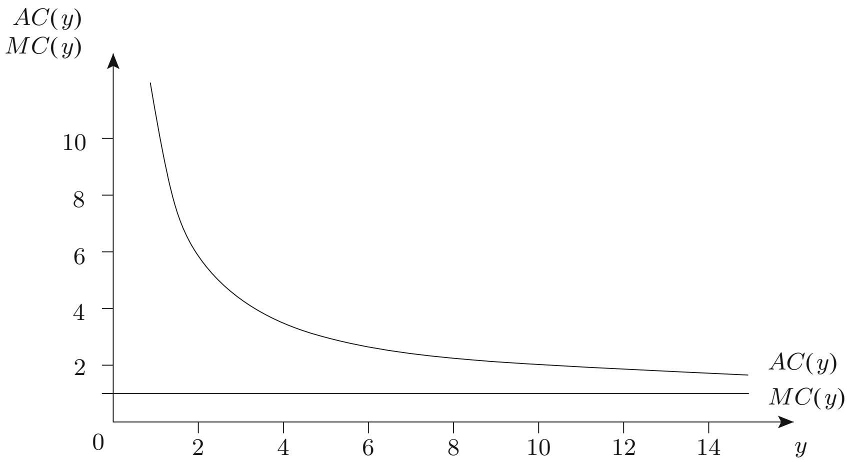


**Fig. 13.1** Average and marginal costs

Average costs decrease strictly for all $y$ and converge to $c$ as $y$ grows large, because $AC'(y) = -FC/(y^2) < 0$ and $\lim AC(y)|_{y\to\infty} = c$. In Fig. 13.1, one can see this relationship in the special case of $FC = 10$ and $c = 1$.

What are the implications of this type of cost structure for the functioning of the industry? First, a single firm can operate a given network more efficiently than two competing firms can that share the market:

$$C(y) = FC + c \cdot y < 2 \cdot C(y/2) = 2\left(FC + \frac{1}{2} \cdot y\right) = 2 \cdot FC + c \cdot y.$$

There are size effects, because an increase in output decreases average costs. Because of this property, industries like the aviation industry have a tendency for concentration, because fixed costs limit the number of competitors that can profitably operate in the market. However, it indicates that the number of firms, for which this is the case, is rather limited. Hence, starting from a situation with a large number of protected airlines, it is very likely the case that competition leads to concentration; some airlines will not be able to survive the process of market liberalization, as soon as they start to compete on some segments of the networks. Airlines were forced to play musical chairs when the European Community decided to liberalize the market. However, to the extent that average costs are downward sloping, the process of market concentration is potentially efficiency-enhancing, because it reduces the total costs of production.

### 13.3.2 The Linear Cournot Model with $n$ Firms

In the following subchapter, assume that the effect of an increase in competition can be captured by the Cournot model of oligopolistic competition. Taken literally, the model could only be applied to flights for which airlines directly compete (e.g. Zurich – Frankfurt), because the products have to be perfect substitutes. The assumption of Cournot competition is, however, innocuous insofar as that the qualitative results do not depend on this specific market model. The assumption of monopolistic or Bertrand competition would lead to similar conclusions. Also, more elaborate pricing strategies, or more complicated models of network competition, with imperfect substitutability, would also leave the qualitative results unchanged. If the qualitative results are robust in this sense one can – remember the epistemic status of positive theories that was discussed in Chap. 1 – go for a simple model.

In order to be able to understand the effects of competition, one can determine the Nash equilibrium for a linear Cournot model, with $n$ airlines that compete in (some segment of) the market. I follow the notation from Chap. 12. (If one is still familiar with the $n$-firm model from Chap. 12, then one can skip the derivation of the Nash equilibrium and jump immediately to the conclusions.)

Assume, for simplicity's sake, that the demand for the services of a given airline is linear and has the following form:

$$p = a - b \cdot Y,$$

where $Y$ is market supply, $a > c$ denotes the maximal willingness to pay in the market and $b$ quantifies how price-sensitive the market is. Denote by $y_i$, the supply of a single airline $i$, and by $y_{-i}$, the supply sum of all airlines except $i$. Then, airline $i$'s profit equation is:

$$\pi_i(y_i, y_{-i}) = (a - b \cdot (y_i + y_{-i})) \cdot y_i - c \cdot y_i - FC, \quad i = 1, \ldots, n.$$

Given the quantity supplied by all other firms, firm $i$'s profit-maximizing supply can be determined by the first-order condition, which establishes the well-known "marginal-revenues-equals-marginal-costs" rule:

$$\frac{\partial \pi_i(y_i, y_{-i})}{\partial y_i} = (a - c - b \cdot y_{-i}) - 2 \cdot b \cdot y_i = 0, \quad i = 1, \ldots, n.$$

A single airline, $i$, behaves like a monopolist on a "curtailed" market with a market-demand function of $p = a' - b \cdot y_i$, where $a' = a - b \cdot y_{-i}$. Figure 13.2 depicts this situation for a curtailed demand function, $p = 11 - y$, and cost function, $C(y) = y + 10$. In this situation, the airline's optimal output is $y^M = 5$, with a corresponding price of $p^M = 6$. Per-unit profit would be $p^M - AC(y^M) = 6 - 3 = 3 > 0$. (Remember that this result need not be a Nash equilibrium: declaring it as such would require specifying all the parameters to make sure that all the other airlines are on their reaction functions, as well.)

This formulation reveals that the relevant demand function for a single airline, $p = a' - b \cdot y_i$, depends on the total quantity supplied by all other airlines, which captures the effect of competition in this model: an increase in $y_{-i}$ shifts the curtailed demand function inwards; an increase in the total supply of the competitors

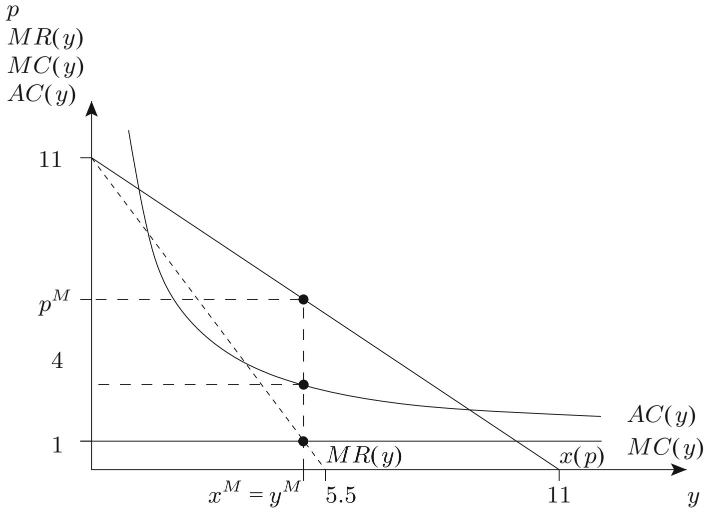


**Fig. 13.2** The airline's optimal policy for a given curtailed demand function

has the same consequences as a reduction in the demand for aviation services does. In the example displayed in the figure, the price is above average costs, which implies that the airline makes positive profits. If competition has the effect of shifting the curtailed demand function inwards, it is easy to see that there is a point at which price equals average costs, such that the airline can no longer operate profitably. This is the point at which the airline is forced out of the market, if it cannot cut costs or make its services more attractive to the customer.

If one assumes that all other airlines supply the same quantity, $y_{-i} = (n - 1)y$, it becomes apparent that this downward shift in the curtailed demand function may be a result of an increase in the quantity supplied by the competitors, holding the number of competitors constant, or the result of new airlines competing in the market. The model, therefore, makes very sharp predictions about the effect of market liberalization on a single airline: as soon as new airlines start to compete with the formerly monopolistic network of, for example, Swissair, this increase in competition "steals" part of the demand from Swissair, which eventually reduces profits to zero. How long it takes before an airline starts making losses depends on its fixed and variable costs.

In order to derive more detailed results, one has to solve for the Nash equilibrium. In general, the first-order conditions specify a system of $n$ equations and $n$ unknowns, $y_1, \ldots, y_n$. If one assumes that identical firms behave identical in equilibrium so that, for any two firms $i$ and $j$, $y_i = y_j$ holds, one can replace $y_i$ with $y$ and $y_{-i}$ by $(n - 1) \cdot y$. One ends up with one equation and one unknown variable:

$$(a - c - b \cdot (n - 1) \cdot y) - 2 \cdot b \cdot y = 0.$$

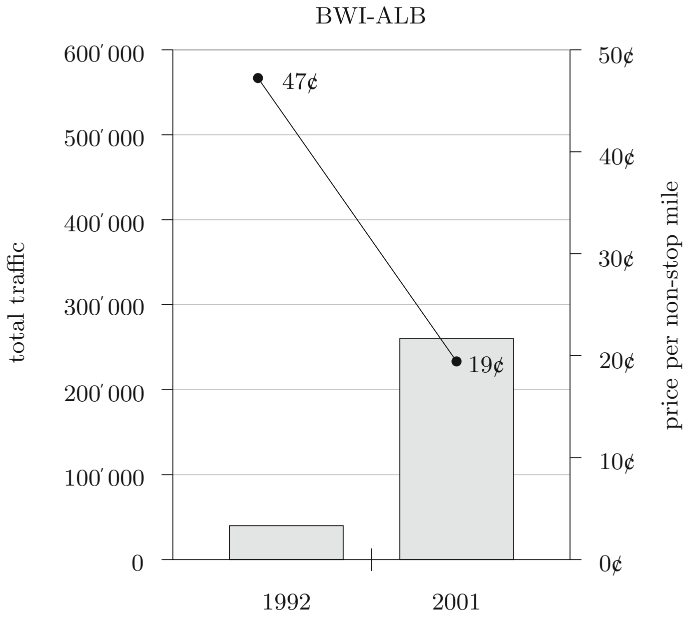


**Fig. 13.3** Prices and demand after market entry

If one solves this equation for $y$, one obtains the equilibrium quantity of a firm as $y^* = (a-c)/((n+1)\cdot b)$ and market supply $n \cdot y^*$ is $n/(n+1)\cdot(a-c)/b$. One can also derive the market price, as well as the airline's profits:

$$p^* = \frac{a+nc}{n+1}, \tag{13.1}$$

$$\pi^* = \frac{(a-c)^2}{(n+1)^2 b} - FC. \tag{13.2}$$

These findings allow a more detailed analysis of the effect of competition (which one can interpret as an increase in the number of competitors $n$ in the market). First, looking at equilibrium prices, one finds that $\partial p^*/\partial n < 0$: an increase in competition brings prices down and, given that demand and prices are inversely related, leads to an increase in total demand.

Reliable data for this effect exists for the US-market. Figure 13.3 demonstrates the potential empirical magnitude of this effect for a single route, the Baltimore (BWI) to Albany (ALB) market for the 1992-2001 period. The entry of Southwest Airlines into the market decreased the average fare by 61%, causing passenger demand to increase by 641%.

The downward pressure on prices, which is caused by competition is, in and of itself, no problem; on the contrary, it can be argued that it makes the market more efficient, because it brings the equilibrium closer to a Pareto-efficient allocation. However, a look at profits reveals that competitive pressure can lead to deeper structural changes in the market. The first term in the profit condition is revenues minus variable costs. It defines the gross margin that an airline can use to cover its fixed costs. This gross margin decreases as the number of competitors increases, which implies that a number of competitors exists, due to which airlines start to make losses. Denote this number by $\bar{n}$. It can be determined from (13.3) by setting profits equal to zero:

$$\pi^* = \frac{(a-c)^2}{(\bar{n}+1)^2 \cdot b} - FC = 0 \Leftrightarrow \bar{n} = \frac{a-c}{\sqrt{b \cdot FC}} - 1. \tag{13.3}$$

If, for example, $b = 1, c = 1, a = 2001$ and $FC = 1.000.000$, then the maximum number of firms that can exist without taking losses is $\bar{n} = 2$. Of course, given that market liberalization heats up competition and competition brings down profits, the maximum number of airlines that can survive in a regulated, quasi-monopolized market exceeds the number of airlines that can survive on a liberalized market. Hence, if the number of airlines that operate in the regulated market, $\hat{n}$, exceeds $\bar{n}$, then cutthroat competition sets in. This was exactly the situation European airlines were confronted with at the beginning of market liberalization.

If cutthroat competition is the effect of market liberalization, one may ask why airlines were willing to enter new, formerly protected markets. The answer to this question follows the logic of Cournot competition and the market-entry game. Assume that an airline does not offer a direct flight from $A$ to $B$ before market liberalization and that it considers opening this route. The incumbent had a monopoly before liberalization and will suffer from market entry. However, even if total market profits fall after market entry, because of competition, it is still profitable to enter, as long as profits are positive. The fact that the incumbent is worse off is irrelevant for the entry decision (one is facing a cooperation problem).

It could also be argued that the picture painted above is incomplete, because an airline like Swissair could compensate the loss in profits in its formerly protected markets (routes) by entering other markets (routes); competition is not a one-way street. In order to see why this logic is flawed, one has to remember that monopoly profits exceed the sum of oligopoly profits in a market. Hence, if two former monopolists on markets $A$ and $B$ start competing with each other on both markets, total profits are reduced. Therefore, the additional profits from entering new markets cannot compensate the loss in profits in one's former monopoly market. The only case where it is, theoretically, possible that an airline can increase its total profits is a situation with asymmetric competition, where the airline enters more new markets that there are competitors entering its formerly monopolized market. (In this example, this effect would trivially occur, if the airline operating market B decides not to enter market A, but the airline operating market A enters market B.) As this chapter already suggested, Swissair was not able to compete on a par with other European airlines because it did not belong to the EEA. Hence, it was much more difficult for Swissair to compensate for losses in the home market by entering new ones than it was for its competitors from the EEA.

The managers of the airlines could have known that market competition would eventually lead to market concentration by either insolvencies of some carriers, mergers and acquisitions, or strategic alliances. What was not clear from the outset, however, was whether Swissair would be among those airlines that survived this process, despite its handicap.

### 13.3.3 Extension: Network Choice, Acquisitions, and Strategic Alliances

The effect of market liberalization was, of course, that airlines started to operate flights on routes that had previously been monopolized. Any new route has an effect on the network structure of an airline and this network structure is such an important factor for an understanding of the functioning of the market that one has to devote some time and energy to this fact so that one can fully appreciate it. In order to do so, one can use the models in the toolbox gained from previous chapters as heuristics so one can develop an understanding of more complex technological and market structures.

Its network structure is an important element for the success of an airline. An airline's network is the collection of routes or connections that it offers. This network structure is important for at least two reasons. First, it is an important determinant of the airline's total costs. Depending on the size and structure of the network, costs may differ and it is, therefore, of great importance to develop and structure the network efficiently. Second, the size and structure of the network influences demand, because it influences the potential customer's willingness to pay.

The second argument can be illustrated by means of the following example. Assume an airline offers a flight between two cities, $A$ and $B$, and considers extending its network by offering a new connection between cities $B$ and $C$. The first effect is, of course, that this new flight creates demand from those passengers who want to travel from $B$ to $C$. However, there is a second, indirect effect, because the new connection creates additional demand by those passengers who want to travel from $A$ to $C$, who can now be served by this airline. Hence, from the airline's point of view, the value of network $A - B - C$ exceeds the sum of values of sub-networks $A - B$ and $B - C$, which is a simple form of a positive network effect. The fact that network effects imply that the total is more than the sum of its parts has implications for the optimal network structure, from the point of view of the demand side: the network should be extended by including additional routes, if the additional revenues from an additional route (including network externalities) exceed the additional costs (airport charges, direct operating costs of the flight, etc.).

The first, cost-saving argument can be illustrated by the same three-cities model with cities $A$, $B$, and $C$. Assume that, for given prices $m$, passengers want to travel from any city to either of the others ($A$ to $B$, $B$ to $A$, $A$ to $C$, $C$ to $A$, $B$ to $C$, and $C$ to $B$). An airline has, basically, two options at its disposal. The first is to offer the full set of connections ($FCN$, fully connected network): that is, to offer the capacity to accommodate demand for each route. The second is to use one of the

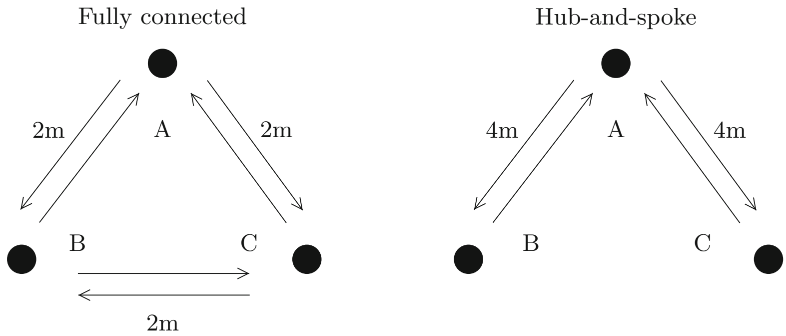


**Fig. 13.4** Different network structures, fully connected and hub-and-spoke

cities, say $A$, as a hub that is connected to both other cities, but to not connect the others directly with each other. Passengers who want to fly from $B$ to $C$, or *vice versa*, need to fly *via* $A$. This structure is called a hub-and-spoke ($HSN$) network. Figure 13.4 shows the two network types and the corresponding traffic flows on each route.

In order to illustrate how network structures influence costs, I introduce a simplified model that illustrates how network structure influences an airline's costs. For simplicity, the study only encompasses a single airline, but the general message remains valid in a competitive environment. The tree different routes are denoted by $AB$, $BC$ and $CA$. Demand is $2 \cdot m$ for each route, $m$ for each direction. The airline's total costs are a function of the number of routes it operates and of the number of passengers on each route. There are fixed costs for operating a route, $F$, and variable costs on each route, $i$, are a function of the total number of passengers, $k$, transported on that route times marginal costs, $c$, so:

$$VC_i(k_i) = c \cdot k_i^{\alpha}.$$

where $\alpha \geq 1$ is a parameter that determines whether marginal cost increase ($\alpha > 1$) or are constant ($\alpha = 1$). Note that $k$ is not necessarily equal to $2 \cdot m$ because, if the $HS$-network is chosen, nobody flies on $BC$, but all the $BC$ passengers have to take a detour *via* $A$, and analogously for all passengers who want to go from $C$ to $B$. In that case, $k_{AB} = k_{CA} = 4 \cdot m$. If the airline offers a fully connected network, $k_i = 2 \cdot m$, then total costs are

$$TC^{FCN} = 3 \cdot c \cdot (2m)^{\alpha} + 3 \cdot FC = 3 \cdot c \cdot 2^{\alpha} \cdot m^{\alpha} + 3 \cdot FC.$$

If the airline decides to operate a $HS$ network instead, then total costs are:

$$TC^{HSN} = 2 \cdot c \cdot (4 \cdot m)^{\alpha} + 2 \cdot FC = 2 \cdot c \cdot 4^{\alpha} \cdot m^{\alpha} + 2 \cdot FC.$$

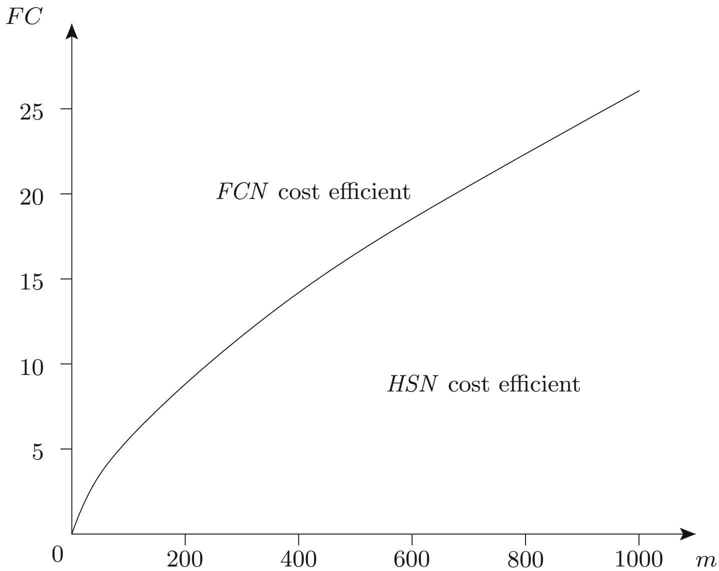


**Fig. 13.5** The function describes the locus on which the total cost of operating the different networks are equal, given $\alpha = 3/2$ and $c = 1$. Below the graph is the area in which a $HSN$ type would be cost efficient; above is the area in which a $FCN$ would be cost-efficient

$HS$ is more cost efficient for the airline than $FC$, if and only if:

$$TC^{HSN} < TC^{FCN} \Leftrightarrow m < \left(\frac{FC}{c \cdot (2 \cdot 4^{\alpha} - 3 \cdot 2^{\alpha})}\right)^{\frac{1}{\alpha}}.$$

In the case of constant marginal costs, $\alpha = 1$, the above condition simplifies to

$$m < FC/(2c).$$

Hence, the relationship between the demand for a given route and the fixed-to-variable-costs ratio is crucial for the optimality of a network structure. Large fixed costs make it, *ceteris paribus*, more likely that a $HSN$ is more cost efficient. This relation is depicted in Fig. 13.5.

Cost efficiency, however, is not the only factor an airline has to take into consideration when it optimizes its network for a given set of possible connections. From the point of view of a customer, it may make a difference whether she flies directly from Zurich to Copenhagen or whether she has to change planes in Frankfurt. Usually, the willingness to pay is lower in the latter case. The optimal network structure, therefore, reflects an optimal compromise between cost efficiency and the willingness to pay.

At the point in time at which the European market started to liberalize, experience from the liberalization of the US market (which went through a similar process more than a decade earlier) already suggested that a $HSN$ is superior to a $FCN$ and most European airlines adopted a $HSN$ structure (Air France with a hub in Paris, Lufthansa with a hub in Frankfurt, KLM with a hub in Amsterdam,...). Swissair, however, resisted that trend and maintained three, large-scale airports in Zurich, Basel and Geneva. In fact, Swissair operated a network that was neither purely $FCN$ nor $HSN$ but, given the size of the Swiss market, it was closer to a $FCN$. While this decentralized structure did not really make the available network more attractive for travellers, because the geographic distance between the three cities is negligible by international standards and the local market is too small to justify such a network, it was (and is) costly to maintain. The additional costs were estimated to be in the high double-digit million Swiss Francs per year.

The decision to maintain three, comparably large, international airports in a small country like Switzerland was, to a great extent, political. Especially keeping the airport in Geneva was a political decision to manifest the equality between the French and German speaking parts of the country. However, political decisions that do not follow the logic of markets have their price and, in the case of Swissair, that price was substantial. The cost-inefficient network structure further reduced the airline's profits over a period of time when increased competition was already driving fares down and cutting back profits.

The analysis up until this point has shown that the effects of liberalization of the airline market are rather complex. First, opening a new route in a formerly protected market has the competitive effects analyzed before. Airlines will start opening new routes, if they can increase their profits by doing so, even if the overall effect is that industry profits go down. For this isolated effect, strategic alliances, mergers and acquisitions are forms of collusive behavior that can increase the airline, as well as the industry profits by coordinating the strategies of the airlines. Hence, the analysis predicts that there is a strong tendency to move in the direction of a more concentrated industry, but the overall welfare effects of concentration are unclear, because concentration allows the airlines to move closer in the direction of a monopolistic solution. Second, opening new routes may have positive network externalities, as well as cost-saving effects, if the extended network can be organized in a more cost efficient way. There are two ways to achieve such a goal: either by an extension of an airline's own network (internal growth), by the formation of strategic alliances, or by mergers and acquisitions (external growth). Both strategic options have their own advantages and disadvantages and it would be beyond the purpose of this case study to analyze them in detail.

## 13.4 How About Swissair?

The analysis of the last sections has shown that market liberalization was likely to erode profits by intensifying competition and that decreasing average costs could easily make airlines unprofitable. Internal, as well as external, growth strategies

**Table 13.1** Main political, legal and economic factors that contributed to Swissair's problems

| | Cause | Effect |
|---|---|---|
| Political factors | Inefficient network structure within Switzerland | Inefficient cost structure |
| Economic factors | Importance of fixed costs | Limits the number of competitors |
| | Increased competition on routes | Pressure on prices and quantities |
| Legal factors | Non-membership in EEA | Inefficient cost and route structure |

(alliance formation, mergers and acquisitions) were key to managing profits during a period of time when the whole industry was likely to consolidate. It is, therefore, no surprise that the world's first and largest global alliance, Star Alliance, was founded in 1997.

European market liberalization was more of a challenge than an opportunity for Swissair, because the vote against the ratification of the EEA Treaty in 1992 implied that Switzerland had to renegotiate the restrictive, bilateral air service agreements with every single EU member-state. Additionally, equal access for Switzerland-based airlines to the EU market was granted only in combination with the Agreement on Free Movement of Persons, which was not fully in force before 2004. Table 13.1 gives an overview of the main factors that contributed to Swissair's demise.

Given the above arguments and, despite of the impediments that resulted from the non-membership in EEA, it seems straightforward that Swissair had its own growth strategy, the Hunter strategy, with the objective to reach a 20 percent market share in Europe. Its aim was to increase its market share by the acquisition of smaller airlines instead of by entering into alliance agreements. (In 1989, however, Swissair was the first European airline to seal a partnership agreement with the overseas carrier, Delta Airlines. Part of the arrangement was a mutual, 5% equity swap. One year later, a similar deal was made with Singapore Airlines.) These airlines created the so-called "Qualifier Group." Table 13.2 gives an overview of the acquisitions, as of 2000.

As can be seen, the Hunter strategy exclusively targeted airlines from smaller European countries like Belgium, Austria, Finland, Hungary, Poland, Portugal and Ireland and, thereby, bypassed the more important and mature markets in Italy, Germany and France.

The idea was to funnel traffic from the accessed markets through Zurich and Brussels to establish two principal hubs within Europe. One key problem with this strategy was, however, a lack of network externalities and cost synergies, because the different networks did not fit together well. On top of that, the strategy diluted the company's valuable brand, because of the lower quality standards of the acquired carriers (effectively only carriers that had been shunned by the other alliances). The dilution of the brand further undermined Swissair's ability to extract premium fares from its passengers.

**Table 13.2** Holdings of Swissair as of 2000

| Airline | Equity stakes |
|---|---|
| Air Europe | 49.0 |
| Volare Air | 49.0 |
| Air Littoral | 49.0 |
| Austrian Airlines | 10.0 |
| AOM France | 49.5 |
| Balair/CTA Leisure | 100.0 |
| Crossair | 70.5 |
| Cargolux | 33.7 |
| LOT Polish | 37.6 |
| LTU Group | 49.9 |
| Portugalia | 42.0 |
| South African Airways | 20.0 |
| Sabena | 49.5 |
| Ukraine International Airlines | 5.6 |
| TAP Air Portugal | 34.0 |

## 13.5 Concluding Remarks

Economic analysis is not like a crime novel where, in the end, the detective manages to perfectly solve the case and to identify the culprit. In economics, there usually is no single culprit and the best an economist can hope for is to identify some of the more important contributing factors, which are related to the industry, regulatory and, ultimately, market context in which Swissair was embedded. Management failure may have played another important role, upon which economists can only speculate without further information. Nevertheless, as the above analysis has shown, management happens within a political, legal and regulatory, as well as economic context that, together, created a huge handicap for Swissair.

1. Increasing competition drove profits down and created a situation of cutthroat competition in which some carriers could not survive.
2. The decision not to ratify the EEA Treaty made it difficult for Swissair to get a foothold in the profitable EEA markets.
3. Growth strategies had to take this strategic disadvantage into consideration and Swissair had to acquire what was left on the market. The resulting network structure was far from optimal. Market share alone was not a good objective.

The purpose of this case study was not to develop a detailed analysis of the economics of aviation industry in general, or the insolvency of Swissair in particular, but to illustrate how different economic theories, combined with empirical facts about politics and law, can be used to better understand certain aspects of reality.