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The influence of airline alliances on the effects of horizontal mergers in the airline industry

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Abstract

A horizontal merger involves at least two competing firms, who chose to bundle their forces into one firm. On the other hand there are alliances, which are institutional forms in which firms collaborate but remain separate entities. This bachelor thesis focused on the effects on consumer welfare of merging firms in the airline industry. Therefore multiple settings were used to assess whether there is a difference between profitability of: Alliance forming, and merging with respect to consumer welfare. Based on a reduced form of a Cournot quantity model, the main conclusion of this thesis is: alliances are most beneficial for consumers. However the European Commission should increase the level of investigations around alliance forming. They should do so in order to make sure firms do not use alliance forming to avoid investigation when their actual goal is to merge. On the other hand research on the optimal level of alliance size, scale, and scope to maximize competition is too limited yet.

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1. Introduction

Mergers occur everywhere around the world. Operating firms with various shapes and sizes, in search for an increase in: efficiency, profitability or market power, take part in these activities. The motivation behind mergers seems as easy as: increase profitability for both firms, because profitability of the merged firms must be larger than the sum of its parts. Through for example: synergy gains, wealth transfers from customers, and gains as a consequence of more private information, firms try to reach this goal (Trautwein, 1990). However, the effect mergers have on the market is a lot more ambiguous and therefore often topic of discussion in scientific literature.

The discussion is based on numerous aspects and effects that occur if a merger takes place. Differing from: strategic variable, consumer effects, producer effects, (abuse of) market power and possible alternatives. For example Sawler prefers alliances to mergers, he considers an alliance: a collaboration with the goal to reduce costs as to sell their products individually and independently, enabling its participants to reap benefits without strengthening competitors (Sawler, 2005).

To make sure consumers are not harmed by these events, the European Commission investigates all merger proposals as part of their competition policy. "Competition policy is not concerned with maximizing the number of firms, competition policy is concerned with defending market competition in order to increase welfare, not defending competitors" (Motta, 2009). The European Commission has the authority to block a merger if the commission considers the risk of a dominant market position significant. Without the European Commission post-merger firms are able to make above industry average profits, by setting price higher than marginal costs (Motta, 2009). The EC recently used its power against the proposed merger between TNT-Express and UPS (European Commission, 2013).

The main reason for alliance forming is: responding to a specific opportunity arising in the market, in need of active participation by suppliers in order to gain an economic surplus for the firms involved, making it a Pareto dominant organizational form (Baron & Besanko, 1999).

Airline alliances are an example where airlines reap the benefits of cooperation, Ivey Business Journal states: Star alliance has changed the competition within the industry as a whole (Gomes-Casseres, 2003).

The growth of the number and size of alliances led to an increased interest in: success factors of an alliance, and its consequences (Shah & Swaminathan, 2008). This Bachelor thesis assessed the consequences of alliance forming, combined with horizontal mergers within alliances and outside alliances. The airline industry has been used to chart the effects of mergers, since it contains mergers in both settings. The recent merger proposal between American Airlines and US Airways, serves as a proper example (Kaufman, 2013).

Part one consists of a theoretical assessment on mergers and alliance forming in order to gain insights in the effects merger and alliance put forward in general, and their potential effect on the airline industry. After the theoretic assessment, the analysis provides a mathematic model to assess the effects of mergers in different settings:

1. Base-case[1];
2. Alliance case;
3. Merger case;
4. Merger within an alliance case;
5. Merger between different alliances case.

Based on this effort there has been proven alliances are most beneficial for consumers, however the European Commission should increase the level of investigations around alliance forming to make sure firms do not use alliance forming as a method to avoid investigations of the European Commission when their actual goal is to merge.

HOW THE ALLIANCES COMPARE

	STAR ALLIANCE	oneworld	SKYTEAM
	As of July 2012	As of Feb. 2013	As of Nov. 2012
Founded	1997	1999	2000
Total revenue US$	185.2 bln	105.5 bln	Not available
Revenue passenger km*	1,374 bln	773 bln	Not available
Annual passengers	697.3 mln	337.5 mln	552 mln
Daily departures	21,956	8,938	15,465
Countries served	193	150	187
Airports served	1,358	850+	1,000
Fleet size	4,542	2,469	4,137

Figure 1 A summary of the three main Airline alliances (Vanderborg, 2013)

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[1] Reduced form of a Cournot competition model.

2. Theoretical framework

The theoretical framework is the fundament of the research. This research took place within the frame set out in this chapter. The first step was to define mergers and alliances and its pros and cons in order to create a valid research.

2.1 Definitions

2.1.1 Mergers & alliances

Mergers come in various ways, vertical as well as horizontal. I assessed horizontal mergers, since these tend to increase market power of insider firms and are representative for the airline industry.

A horizontal merger is a merger between two competing firms in the market (Motta, 2009). The main pro-merger argument is based on its goal: increasing profitability for both firms, making the merged entity more profitable than the sum of its parts. Through for example: synergy gains, increased market power, and gains as a consequence of more private information (Trautwein, 1990).

This statement is opposed by the merger paradox, defined as: a situation in which post-merger profitability is diminished by the increased competition of non-merging competitors (Sawler, 2005). One could name alliance forming as strategic substitute for merging, since they share a common purpose. This purpose is best described by the following quote: "combine complementary capabilities to realize strategic goals"[2] (Sawler, 2005). An alliance was defined as: "an intermediate form of organization between consolidation of suppliers, as in a merger, and remaining separate entities" (Baron & Besanko, 1999). If

Figure 2 The main Alliances and their airlines, larger version in the appendix, (The Backpackr, 2013)

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[2] "Including the following: reducing transaction costs, gaining access to new technologies or resources, gaining access to new geographic and product markets, achieving economies of scale and scope, reducing financial risk, integrating markets and technologies, increasing the rate of new product or process development, and reducing the cost or risk of research and development." (Sawler, 2005)

two firms merge they become one firm, while in case of an alliance they remain separate firms[3].

To finalize this subsection, Sawler states the following goals of collusion: "an alliance, where partners collaborate to reduce costs but sell their products independently, enables its partners to realize the benefits of merging but avoids the problem of strengthening competitors" (Sawler, 2005). The appendix figures 4 & 5 shows there can be different levels of integration within alliances, I will get back to this subject later on.

2.1.2 Gains

The next step in the process was to determine what would be considered a gain or a loss resulting from a merger or alliance. As previously mentioned the goal of this thesis is to present a harbinger for the European Commission to take into consideration when airlines plan to merge or form an alliance in the future. I chose to take the goal of competition policy, guarded by the European Commission, as viewpoint when reviewing possible gains and losses resulting from mergers. In order to concretize this goal, Motta uses the following definition: "Competition policy is not concerned with maximizing the number of firms. Competition policy is concerned with defending market competition in order to increase welfare, not defending competitors" (Motta, 2009). This overall term pointed out competition policy aims at protecting consumers for firms gaining too much market power. Motta refers to market power as a firms' ability to set their price above a certain benchmark level in a profitable way, this is usually the difference between price and marginal costs of production (Motta, 2009).

It is understandable that more market power leads to a disadvantage for consumers. Therefore they should be protected against these situations. However notice, market power is not always bad. The prospect of market power is fundamental for firms to acknowledge investment and research and development (R&D) as a necessity for profitability. Having no market power would hurt consumers in the long run through for instance: number of new products, product quality, and price of products. Since all these aspects depend on the level of investment and R&D (Motta, 2009). This is the reason policy is not meant to shut down monopolies nor firms that possess market power. For as long as performance is based on legitimate business practices, instead of disrupting the competitive process it should be allowed (Motta, 2009). To conclude, I will assume consumers do not benefit in case of a price increase or a quantity decrease. The next part of this chapter will focus on competition and the effects of mergers.

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[3] This becomes clear if one takes a closer look at Airline Alliances in figure 2.

2.1.3 Competition models

Markets can be identified in multiple ways. Not only the way products are manufactured, but also the way firms compete plays a key role. From a micro-economic perspective the main models of competition are[4]: Bertrand pricing competition, and Cournot quantity competition (Frank, 2010).

2.1.3.1 Bertrand pricing model

Product price is the strategic variable in a Bertrand competition model. This means competing firms set a price and produce as a result of that price a certain profit maximizing output. Deneckere & Davidson assessed the reason behind this mechanism and found out this is caused by upward-sloping reaction functions. This opposes the downward-sloping reaction functions of quantity games, where: an increase of the initial price by the coalition leads to an increase in price of all firms. This leads to a further increase in price by the coalition until a new equilibrium has been reached, where all firms are better off (Deneckere & Davidson, 1985). However there is one downside, which gains strength when the size of the coalition increases. This problem is caused because the larger a coalition is, the higher the prices they charge. As a consequence a free-rider problem occurs: firms outside of the coalition face larger benefits from a larger concentration than the insiders do (Deneckere & Davidson, 1985). From a consumer's perspective it is not a beneficial merger, since the increase in price makes it only beneficial for the competitors in the market (Deneckere & Davidson, 1985)

2.1.3.2 Cournot quantity

A Cournot quantity competition model opposes a Bertrand competition, as quantity is the strategic variable. This means firms base decisions on their profit maximizing output level instead off price level. A merger in a Cournot setting possibly leads to a situation known as the merger paradox.[5] The situation emerges when a merger leads to a reduction in the number of strategic players participating in the market. As a consequence a gap arises between current output and profit-maximizing output, forcing the post-merger firm to revise its output level. After the post-merger firm set a lower output level, rival firms tend to increase competition. The effect of this action is a decrease in aggregate output and an increase in price.[6] Farrell and Shapiro (1990) assessed the nature of synergies, degree of synergies, and economies of scale required for a merger to maintain prices. In their article they identify a number of factors significantly influencing the effects of a merger on price level. One particular important factor is the following: as market shares of the included firms increase, or as industry demand elasticity decreases, the learning effect or economies

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[4] Stackelberg leadership was left out of the scope.
[5] Based on the work of Salant, Switzer and Reynolds (1983), (Neary, 2007).
[6] Farrell & Shapiro found that in case the merger leads to an increase in collusive behavior on the market instead of a higher level of Cournot behavior this presumption was even stronger (Farrell & Shapiro, Horizontal Mergers: An Equilibrium Analysis, 1990).

of scale must be larger to achieve lower prices (Farrell & Shapiro, 1990). So there are possibilities for horizontal mergers to be profitable however the gains have to be significant. This is supported by the findings of Franklin Fisher (1987):

"The burden of proof as to cost savings or other offsetting efficiencies, however, should rest squarely on the proponents of a merger, and here I would require a very high standard [of proof]. Such claims are easily made and, I think, often too easily believed" (Fisher, 1987).

With respect to the airline industry I chose to consider the industry as a Cournot Competition. Agusdinata & Klein (2002) assessed the air travel industry and found: in times of economic downturn consumers get more price sensitive, putting airlines in a price battle. On the other hand an economic upturn makes consumers more service sensitive and less price sensitive. This leads to the situation in which changes in Gross Domestic Product (GDP) are caused by changes in the way the airline industry competes for customers (Agusdinata & de Klein, 2002). As one might notice the goal of the airlines is to maximize price, under which all available seats on all available miles are filled as to maximize profits. This phenomenon is known as seat inventory management (Belobaba, 1987). The number of seats is the constraint. If airlines would compete on price, the situation could arise that companies are not able to meet actual market demand.

2.3 Advantage of mergers for airlines[7]

So far horizontal mergers were critically assessed, however there is another side to the story. A study by the European Commission showed: 'cross-border mergers' dominate the list of adjustment choices to the extension of the European Market (Neary, 2007). According to the Merger Guidelines most mergers are "competitively beneficial or neutral" (Farrell & Shapiro, 2000). Consider the difference between merger-specific, meaning claimed efficiencies only occur if the merger continues, or not merger-specific[8] (Farrell & Shapiro, 2000). This subsection provides numerous advantages of mergers.

Gains of mergers are divided in two different motives based on the main argument: "profits of the merged entities exceed profits of independent entities" (Shaver, 2006). Post-merger gains as a consequence of increased efficiency are numerous and vary in their nature. One could think of: 1) Cost advantages through internal knowledge sharing within the post-merger firm. This leads to an

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[7] In this part I assessed the advantages of mergers, I chose to assess the effects of mergers that potentially could lead to consumer benefits. For instance if one looks at efficiency gains, these can be used to lower the price and therefore benefit consumers.

[8] The method used by Farrell and Shapiro is following: "Ultimately, we should ask what *will* likely happen with the merger, relative to what will likely happen without it. The mere theoretical possibility that efficiency could be achieved through means other than the proposed merger does not prove that it would in fact happen absent the merger. Efficiencies that would be achieved post-merger but that in fact would surely not happen absent a merger, must be considered merger-specific, no matter how imaginable someone might find their realization absent merger" (Farrell & Shapiro, 2000). This is in line with the Merger Guidelines.

increased level of innovation, and standardization[9] on one hand. On other hand this leads to lower fixed, and corporate overhead costs[10] (Farrell & Shapiro, 2000); 2) Airlines share their firm-specific assets after a merger. Thereby increasing: variety of destinations[11], maximum servable capacity[12], and efficiency of its assets[13]; 3) Synergies based on a more efficient management-structure; 4) Integrating the decision making process with respect to prices and marketing of various products[14] (Shaver, 2006). Farrell and Shapiro stated: "A synergy will not be achieved by one firm unilaterally without the merger"[15] (Farrell & Shapiro, 2000). Mergers with synergies are far more feasible to gain positive influence on consumer welfare (Farrell & Shapiro, 1990).

Consider the effect of pre-merger collusive behavior. Farrell and Shapiro found out if two firms in a Cournot setting possess market shares of twenty percent each, in a unit-elastic market, prices increase if firms do not increase their output efficiency by twenty percent (Farrell & Shapiro, 1990). Vasconcelos provided the following insight from a consumer perspective: output is maximized if capital is equally divided between the firms operating in the industry (Vasconcelos, 2010).

Continuing on the effects of pre-merger behavior on the positive effects of mergers. Farrell and Shapiro (2000) offered the following situation of pre-merger behavior beneficial to consumers: If two firms are involved in highly collusive pre-merger behavior, tacitly or explicitly, in a way that each firm owns half the market, but neither one of the firms reaches efficient output. One could consider the price set by both firms as the monopoly price given output and costs. Merging the two firms, combining outputs, facilities, and increase cost efficiency[16] will result in a lower price than in the pre-merger situation (Farrell & Shapiro, 2000).

The next part focused on advantages of an alliance, and a comparison on some characteristics of alliances making it preferred to mergers.

2.4 Advantage of alliances for airlines

As previously defined strategic alliances differ from mergers in firms remaining independent. In other words: an alliance is a cooperative agreement between multiple firms (Das & Teng, 2002). Agreements between airlines always characterized the industry, however the OECD noticed a strong

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[9] Farrell & Saloner, Standardization, compatibility, and innovation, 1985

[10] According to Shaver the merger provides a platform that catches positive spillover effects which enables the post-merger firm to reap the benefits from synergy gains (Shaver, 2006).

[11] According to the OECD Roundtable "Most travelers are not flexible in their origin and destination cities" (OECD Competition Committee, 1999).

[12] Also because of a lack of landing slots or "suitable airport capacity" (OECD Competition Committee, 1999).

[13] With respect to airlines it can be profitable to merge if, as a consequence, a new popular destination can be reached, because there is more capacity available. Especially in the airline industry capacity can make the difference as a strategic variable. The influence of capacity however is more relevant if it leads to reduction of average costs instead off increasing the revenue stream (Shaver, 2006).

[14] Shaver states umbrella branding of products as a marketing advantage (Shaver, 2006).

[15] The Appendix figure 6 shows when Farrell and Shapiro consider efficiencies as synergies, or not.

[16] Marginal and average.

increase in the number of agreements and alliances starting around 1995. This continuing expansion does not only increase the number of alliances but also changed its nature. The scope and depth of alliances can be subject to serious competition issues and are signs of this changing nature (OECD Competition Committee, 1999).

Alliances are expected to fulfill the same role in the future as to enhance profitability (Airline Leader, 2012). Every alliance varies in goals, level of complexity, extent to which it is possible to interpret a certain outcome, and level of co-specialization (Gimeno, 2004). These goals vary from sharing private information (Baron & Besanko, 1999), overcome entry barriers[17], create entry barriers (OECD Competition Committee, 1999), provide complementary services[18], strengthen or expand market presence (OECD Competition Committee, 1999), share loyalty programs to increase switching costs (Klemperer, 1987), product bundling (Holmberg & Cummings, 2009), and perhaps aligning the full line of business. In the airline industry it is possible to get involved in a code sharing agreement[19] without being member of an alliance, although the department of justice has to approve on this (Brueckner, 2003). Multiple examples of alliance goals were provided. The complexity and process of partner selection however is based on four pillars:" Trust, commitment, complementarities, and value or financial payoff" (Shah & Swaminathan, 2008).

To summarize previously stated goals, Holmberg and Cummings defined three basic pillars behind strategic alliances: 1) Co-opting rival firms by gaining competitive strength; 2) co-specialization, enjoying synergy gains by the combination of different complementary resources and skills; 3) learning effects and internalizing skills (Holmberg & Cummings, 2009). One might consider these actions only beneficial towards firms within the alliance, but that is not the full story.

Luo, Shenkar and Gurnani defined four situations of strategic alliance varying from 'loosely connected' to 'tightly integrated'[20] (Luo, Shenkar, & Gurnani, 2008). I mentioned these levels because according to Oum, Park, Kim, & Yu (2004): the more intense strategic alliance cooperate the higher benefits are in terms of profitability and performance. Not only firms benefit, depending on the viewpoint of research: "alliance partners charge interline fares[21] approximately twenty-five percent

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[17] Stigler defines conditions of entry a: "Cost of producing which must be borne by a firm which seeks to enter an industry but which is not borne by a firm already in the industry" (Schmalensee, 2004). It is possible that established firms on long-distance flights are able to support their smaller alliance partners.

[18] For instance: landing slots, gates, handling facilities, maintenance services, and catering services (European Commission, 2002).

[19] "With Code sharing, a trip is ticketed as if it occurred on a single carrier, even though some of the route segments are operated by the code share partner" (Brueckner, International Airfares in the Age of Alliances: The Effects of Codesharing and Antitrust Immunity, 2003).

[20] They define four situations: "Loosely Connected, Equity Hostage, Tightly integrated, and Trusting" (Luo, Shenkar, & Gurnani, 2008).

[21] The fares paid by airlines to another airline to provide a full-service ticket to destinations not directly served by an airline.

below those charged by non-allied carriers" (Brueckner & Whalen, 2000)[2223]. Notice however, although not proven significantly by Brueckner and Whalen, it is intuitively appealing if two carriers used to compete on a route, fares increase as a consequence of reduced competition (Brueckner & Whalen, 2000). This can be a reason for the European Commission to block high levels of cooperation.

An important aspect mentioned by Brueckner and Whalen (2000) was: alliances reap more benefits because they enjoy 'Antitrust immunity'. This enables alliance partners to engage in 'cooperative pricing' and increase switching costs through for example frequent-flyer programs (Brueckner & Whalen, 2000). They mentioned cases of alliances turning out to generate anticompetitive effects, because the line between alliance and merger becomes less clear. For example the case of KLM and Alitalia, where the Financial Times stated: KLM and Alitalia are practically merging but not in name (OECD Competition Committee, 1999). This increased depth of cooperation can lead to benefits for consumers but also raised serious concerns on the side of competition effects. The OECD raised concerns on the fact alliances are becoming more like mergers and therefore there is an increased chance of anti-competitive effects from alliances. The European Commission investigated alliances but ceased investigation. It was an investigation in two alliances: Star alliance on one hand and Wing alliance[24] on the other. This shows the European Commission suspects possible competition deterrence as a consequence of alliance forming in the airline market. The fact they ceased their investigation could be the consequence of a successful lobby by the alliances (Coen, 1998).

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[22] In this case Brueckner considers code sharing agreements and anti-trust immunity granted by the Department of transportation as important factors to the fair reductions (Brueckner, International Airfares in the Age of Alliances: The Effects of Codesharing and Antitrust Immunity, 2003).
[23] Not only international but also domestic airline alliances benefitted consumers with average lower fares between five and seven percent (Bamberger, Carlton, & Neumann, 2004).
[24] Which mostly became what is now known as Skyteam (European Commission, 2002).

3.0 Analysis

3.1 Base case

The base case served as a formal starting point towards the final result. By means of algebra I proved previously stated definitions and explanations. The base case model considered two firms operating in an oligopolistic market. In order to get to the core of this research, I chose to assess a reduced form of a Cournot Model for homogeneous goods.[25] Prices differ proportionally as a consequence of distance covered by the trip. With respect to costs of airlines I chose to look at the costs of a seat within the airline itself, and later on to interline fares.[26] In the following subsections this price differed, but for now I assumed no alliances yet. To clarify, the base-case considers the way in which firms compete in the market for airlines, based on a number of variables that will be clarified. These variables affect competition, price, and profit. I considered optimal profit as a function of output as leading in the research.

Before the algebraic part, a number of assumptions were provided: 1) A location is considered a destination if it is served by at least one airline; 2) there is no correlation between the destinations served by the airlines; 3) the network is connected making it possible to reach every destination from a destination, although it might be indirect; 4) the share of destinations covered by an airline, and therefore the part of the market they are able to serve themselves, is caught by Di[27].

'i' stands for the airline, and the values range from 0, no destinations served, to 1, all destinations served; N, number of firms, is two; D is equal for every firm, providing symmetry in the industry.

The price in the market is given by the following inverse demand function:

(1) $P(Q) = \alpha - bQ$

Besides price there is also a cost function for every participating firm, for firm i:

(2) $C_i(q_i) = D_i c + (1 - D_i)\beta_1(\alpha - bQ) - (1 - D_j)\beta_1(\alpha - c - bQ)q_j$

Where cq_i is the number of journeys (q_i), may consists of several flights, provided by the airline itself multiplied by its costs(c). These are typical costs, not network or geographical specific costs because it is the base-case. $(1 - D_i)\beta_1(\alpha - bQ)$ Shows the chance an airline cannot provide service to a destination times the influence on price, multiplied by the market price. Finally $(1 - D_j)\beta_1$ is the last effect to model. This is the ratio of destinations not served by a rival firm, but can be served by firm i. This effect is multiplied by ratio β_1 $(0 < \beta_1 < 1)$ multiplied by the market price in order to get the price paid by rival firms to i in return for the journey. β_1 Was used again since I assumed market

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[25] "Products that vie with each other but which have little or no differentiation in terms of features, benefits, or quality and are, therefore, forced to compete on price or availability" (Klemperer, 1987), in this case compete on availability.

[26] The fares paid by airlines to another airline to provide a full-service ticket to destinations not directly served by an airline.

[27] $Di \in (\frac{3}{2}, 1)$.

symmetry, therefore it is appealing to keep prices they ask for their products equal. Meaning it is equally expensive for airline A to buy tickets at Airline B, as it is for Airline B to buy at Airline A.

The next step in the process is to create a profit function (3).

$$\pi i(qi; Q_{-i}) = \left(a - (D_i c + (1 - D_i)\beta_1(\alpha - bQ) - (1 - D_j)\beta_1(\alpha - c - bQ)q_j) - bq_i - bQ_{-i}\right)q_i$$
$$+ \beta_1(\alpha - c - bQ)(1 - D_j)q_j$$

(4) $Q^* = \dfrac{1}{b}\dfrac{N}{N+1}\dfrac{\left(\alpha - D_i c + (1-D_i)\beta_1\alpha + (1-D_j)\beta_1 bq_j\right)}{(1-(1-D_i)\beta_1)}$

(5) $q_i{}^* = \dfrac{1}{b}\dfrac{1}{N+1}\dfrac{\left(\alpha - D_i c + (1-D_i)\beta_1\alpha + (1-D_j)\beta_1 bq_j\right)}{(1-(1-D_i)\beta_1)}$

Making the optimal situation:

(6) $\pi_i(q_i{}^*; Q^*) = \dfrac{1}{b}\left[\dfrac{1}{N+1}\dfrac{\left(\alpha - D_i c + (1-D_i)\beta_1\alpha + (1-D_j)\beta_1 bq_j\right)}{(1-(1-D_i)\beta_1)}\right]^2$

Looking at the optimal profit function I concluded the following with respect to competing firms in an industry without alliances. Profits increase in the following situations[28]: 1) if $\frac{1}{b}$ increases, this can be the consequence of scale economies driving down b; 2) the driving force behind increasing profits is the effect of an increase in D_i, squarely increasing profits on two sides of the fraction. In the case of airlines it is profit maximizing, with respect to optimal quantity, to serve the highest possible level of destinations. Note it is profitable for firm i to have the highest possible value for $(1 - D_j)$; 3) an increase in the number of firms, N, negatively influences profits, for every increase in N profits decrease; 4) β_1 does not influence the optimal profit level, this is correct since I assumed market symmetry. This means β_1 works on the buy as well as the sell side of the company cancelling each other out. To summarize the effects of the base-case: an airline should prefer to maximize the number of destinations whilst reducing the number of competing firms to a minimum. This analysis sounds intuitively appealing if one notices the current situation in competing industries.

Having set this benchmark, it is time to review cases of alliances and mergers to assess whether different effects arise in the industry as a consequence of these events. This was done in a qualitative way, based on the literature described previously and the base-case.

3.2 Case: effect of an alliance

In case of an alliance the story becomes slightly different. Complementary effects of alliances have to be incorporated in the model. Let's assume a case of two alliances: A and B, consisting of N_a & N_b firms[29]. Two effects taking this change into account were added. First of all the model is similar to the model used in the base-case. Though the intuition behind certain variables was pulled to a higher perspective. I assumed buying a seat at an alliance partner is equally expensive compared to

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[28] For all these effects are assumed ceteris paribus.
[29] $N_a = \{1, \dots, n_a\}$; $N_b = \{n_{a+1}, \dots, n\}$; $n_a + n_b = 1$; $|N_a| = n_a, |N_b| = n_b$.

delivering the service by the airline itself and the other way around. Since I assumed price symmetry, there is no reason to belief some firms within the alliance reaping more benefits from the alliance than others do. There is an effect alliances exert on the level of destinations airlines serve at lower prices compared to rival firms. This effect leads to lower costs on a higher number of destinations served. On one hand increased levels of destinations served make alliances more feasible to demand by rival firms. On the other hand the number of destinations covered by rival alliances increases as well. In order to integrate these effects the following variables were added to the base model as described in section 3.1:

- ❖ D_a = Chance a journey is served by alliance a[30];
- ❖ D_b = Chance a journey is served by alliance b;[31]
- ❖ $(1 - D_a)$ = Chance the trip is not served by the airline itself nor the alliance[32];
- ❖ $(1 - D_b)$ = Chance a competing alliance buys seats for a destination at alliance a[33].

Notice the increased size and perspective of the model. An alliance is nothing more than a means to increase the number of destinations served, by the use of scale economies.[34] This is shown by $D_a > D_i$ embodying the increase in the number of destinations compared to a situation without an alliance and decreases the number of seats an airline has to purchase at rival alliances, leading to lower costs. This effect is larger compared to the decrease in quantity sold to rival alliances as a consequence of their increase in D_j.

This showed it is advantageous for airlines to get involved in an alliance, as an increase in D_i has significant positive consequences with respect to profitability. Notice the effect is maximized if the level of complementarity is maximized. This is of great importance for airlines in search of possibilities to engage in alliance forming. The levels of $\frac{1}{b}$ and N will not change as a consequence of alliance forming. In case of: $\frac{1}{b}$ because synergy effects are modeled as an increase in D, and in case of N because the number of firms remains equal. Finally to get back to the goal of the thesis, consumers benefit from an alliance as higher levels of efficiency arise.

3.3 Case: mergers

The third case considered merging airlines in two different situations. I chose to assess different situations to compare results with 'ordinary' alliance forming. The first situation considered a merger within an alliance to assess whether this results in higher optimal profits compared to ordinary

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[30] $D_a > D_i$; $0 < D_a < 1$; D_a , percentage of destinations covered by alliance a, is equal to $\sum_{i \in N^a} D_i$ multiplied by a factor correcting overlap in destinations between airlines.

[31] $D_b > D_j$; $0 < D_b < 1$; D_b, percentage of destinations covered by alliance b, is equal to $\sum_{j \in N^b} D_j$ multiplied by a factor correcting overlap in destinations between airlines.

[32] $\prod_{i \in N^a}(1 - D_i)$.

[33] $\prod_{i \in N^b}(1 - D_j)$.

[34] Although it appears strange at first sight, it is intuitively appealing and backed by previously mentioned theories for example Baron & Besanko, 1999.

alliances. The second situation assessed the consequences of a merger between alliances to come to an optimal result.

As previously mentioned mergers and alliances become more and more alike nowadays, though there are differences exerting influence on the outcome. In case of a merger the number of N firms is reduced, leading to a new optimal quantity provided by the post-merger airline. This new optimal quantity is lower due to a higher price, creating a platform for the merger paradox to occur. The only way to not get involved in the merger paradox is to increase total quantity. By assessing two situations concerning mergers and alliances, I attempted to provide the best solution.

3.3.1 Merger within an alliance

I considered the model of 3.1 and 3.2 again to visualize the effects of the merger. Consider Firm I and J, which are part of alliance (A). If J and I decide to merge, the following happens with respect to their profit function:

❖ D_{ij} = Chance a destination is served by post-merger airline IJ[35];

❖ $(1 - D_{ij})$ = Chance a destination is not served by the merged airline, but is by the alliance[36];

❖ $(1 - D_b)$ = Chance a competing alliance buys seats for a destination at alliance a[37].

If one looks at the model and compares this outcome to the outcome of the ordinary alliance model, the effects of merging seem minimalistic: 1) There is no increase in ratio of destinations the post-merger firm serves compared to the situation with an ordinary alliance; 2) cost-reductions compared to an alliance situation are only based on knowledge sharing, lower fixed/corporate overhead costs and synergies based on a more effective management structure. It is highly doubtful whether these factors would lead to a twenty-percent increase in output required, according to Farrell & Shapiro (1990), in order to maintain pre-merger price level. This model did not include the reduction on interline fares between alliance members; 3) the number of firms (N) reduces by one; in combination with inability of an airline to increase output in the new optimal situation creates the possibility of the merger paradox. This reduces post-merger profits, creating a possible loss compared to the pre—merger situation.

The synergy gains are taken by the alliance. As mentioned in literature, mergers and alliances are becoming more alike. It is an intuitive thought the positive effects of merging within an alliance are weakened by the alliance. Therefore the effect on consumer welfare is unlikely to be positive compared to the base case or alliances in the airline industry. Merging within an alliance seems a

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[35] This probability is equal to = $1 - (1 - D_i)(1 - D_j)$; $D_a > D_{ij} > D_i$; For all D variables $0 < D_{a;ij;i} < 1$;

[36] $\prod_{ij \in N^a}(1 - D_{ij})$.

[37] $\prod_{i \in N^b}(1 - D_x)$.

waste of time and money, compared to alliance forming. High level of increased efficiency described by point two are presumably the only thing that could prove this statement wrong.

3.3.2 Merger between alliances

The situation changes if an airline (y) from competing alliance (B) decides to merge with airline (i) from alliance A. To model this difference in effects, I assessed the variables of the base model again:

- ❖ D_{iy} = Chance a journey is served by post-merger airline iy[38];
- ❖ $(1 - D_{iy})$ = Chance the trip is not served by the merged airline, but served by the alliance[39];
- ❖ $(1 - D_b)$ = Chance a competing alliance buys seats for a destination at alliance a[40].

I assessed this model in two ways: 1) y is a small[41] firm compared to average alliance b airlines; 2) y is a large firm compared to the average alliance b airlines.

If y is small, the effects of merging exerts the following influence on alliances: 1) the increase in D_a will be small[42], decrease in D_b will be small as well. The two effects together, make this a lucrative deal for post-merger airlines and its alliances, especially compared to mergers between airlines in the same alliance; 2) this merger does not only influence synergies on the side of an increase in D_a, also fixed/corporate overhead cost savings, cost savings trough more efficient management levels, knowledge sharing and sharing firm specific assets[43] are possible consequences. The increased number of efficiency effects makes it more likely for post-merger firms to reach the twenty-percent output increase, required to maintain price level (Farrell & Shapiro, 1990); 3) this effect is enforced by a decrease in the number of firms in alliance B by one, reducing competition in alliance B. This increases competition by alliance A, making it a more profitable move.

In case airline y would be a large firm, the intuition as described above remains the same. The only difference is the scope of the effects taking place. The effects are obviously increasing if the airline is large compared to the average airline in the alliance. 1) Increase in D_a and the decrease in D_b are both larger, doubling the amount of the effect; 2) all synergy effects as described in the situation with a small y, are larger compared to the situation of a small y; 3) the effect of losing a large N affects the decrease in competition in alliance B, making the strategy of alliance A more competitive.

Although the difference between merging within the same alliance or two firms form different alliances seems small for a bystander, the effects modeled exert significant influence on the

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[38] This probability is equal to = $1 - (1 - D_i)(1 - D_y)$; $D_a > D_{iy} > D_i$; For all D variables $0 < D_{a;iy;i} < 1$;
[39] $\prod_{iy \in N^a}(1 - D_{iy})$.
[40] $\prod_{i \in N^b}(1 - D_x)$.
[41] Meaning small in the number of destinations as well as small in the number of available seats.
[42] Assuming firms will only merge and switch alliances if there are synergy gains to be made.
[43] Higher amounts of: Seats, airplanes, landing slots and service employees.

outcome. Differences in both outcomes on one hand are produced by the fact that synergy effects of mergers are largely taken away by alliances. On the other hand effects are enhanced because they reduce power of rival alliances, making all effects larger compared to a situation of merging within an alliance. The combination of effects decreases the risk of the merger paradox occurring.

4. Conclusion

Merging and alliance forming are everywhere around us in various shapes and sizes. The airline industry, with high levels of proposed merger and alliance forming activities, is a perfect example of this trend. This thesis assessed the effects of mergers in different settings, within and between airline alliances, in a market characterized by Cournot quantity competition. The goal of this assessment was to serve as a tool for the European Commission when mergers in the airline industry are proposed in the future. Before I will turn to the main conclusion, parts will be addressed in short.

First, gains of mergers were addressed. Although gains vary, I mentioned four main possible ways of gains from mergers: 1) Through cost advantages; 2) sharing firm-specific assets; 3) synergies through more efficient management-structures; 4) integration of decision-making process. Though before a merger leads to lower prices, there have to be significant efficiency gains for the post-merger firm. The downside of mergers can be found in two effects: 1) The merger paradox; 2) market dominance. Both effects are unwanted, because they harm consumers through higher prices, both as a result of a less competitive strategy.

Second, gains of alliances were addressed. Alliances gained popularity, from which the airline industry is, a good example. Basically mergers and alliances differ in the fact that in an alliance firms remain separate entities. Besides alliances are formed with a specific goal e.g.: sharing private information, overcome entry barriers, create entry barriers, provide complementary services, strengthen or expand market presence, share loyalty programs, product bundling, or align the full line of business. The level of cooperation within an alliance tends to become more and more like a merger. One of the reasons is found in the analysis of Oum, Park, Kim, and Yu (2004) stating: the more intense strategic alliance are cooperating the larger the increase in benefits in terms of profitability and performance. The downside of alliances is the antitrust-immunity they possess, boosting alliance market dominance, ultimately hurting consumers.

Having assessed various kinds of mergers and alliances with respect to the airline industry, brought me to the following conclusion:

The airline industry is a highly competitive market faced by Cournot quantity competition. Alliance forming in this setting has proven valuable for firms and consumers[44]. Mergers within alliances only seem to hurt the positive effects of the alliance both airlines participate in. Mergers between alliances boost alliances where the post-merger firm is part off. However one should question whether it is more profitable to switch alliances without merging, since the effects of alliance forming without merging always seems positive for the participating firms. However with respect to

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[44] Enforced by the observation that airline alliances still exist

consumer welfare it is important to notice the difference between alliances and mergers becomes smaller, though research on behalf of anti-competitive effects of alliances is far behind on the level of merger control. This leads to serious disadvantages to consumers now and in the near future. My advice for the European Commission is to critically assess: goals, potential effects, and overlap between firms before granting permission. On the other hand the level of research with respect to alliance partners and consequences for consumers has to increase. This would enable the European Commission to critically assess proposed activities and make sure firms do not use alliance forming as a means to avoid investigations by the European Commission. Though I proved alliances are beneficial for consumers, there is a turning point where advantages turn into disadvantages, which has not been properly researched.

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Appendix

Figure 3 The main Alliances and their airlines (The Backpackr, 2013)

ALLIANCE MEMBERS WITH 'HIGH LEVEL COOPERATION': THE BRIGHTEST PART OF THE SPECTRUM

STAR	ONEWORLD	SKYTEAM
Air Canada	American Airlines	Air France-KLM
Lufthansa	British Airways	Alitalia
United-Continental	Iberia	Delta

Figure 4 Highest level of cooperation in different alliances

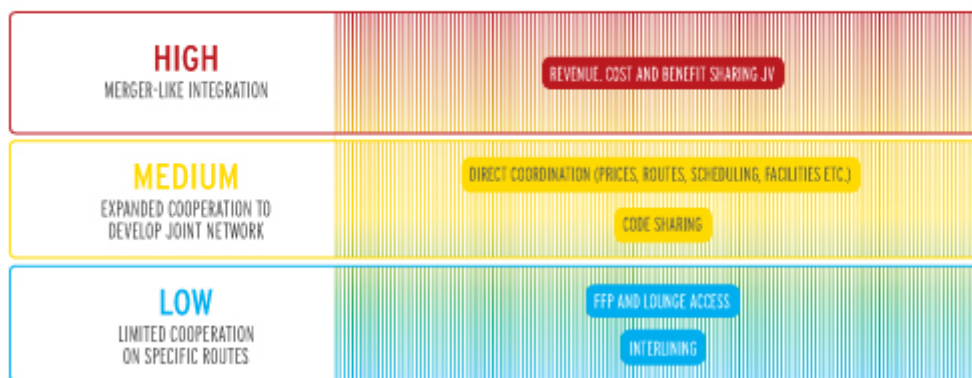## SPECTRUM OF ALLIANCE COOPERATION: ALLOWING SOME TO COOPERATE MORE THAN OTHERS

HIGH
MERGER-LIKE INTEGRATION
REVENUE, COST AND BENEFIT SHARING JV

MEDIUM
EXPANDED COOPERATION TO DEVELOP JOINT NETWORK
DIRECT COORDINATION (PRICES, ROUTES, SCHEDULING, FACILITIES ETC.)
CODE SHARING

LOW
LIMITED COOPERATION ON SPECIFIC ROUTES
FFP AND LOUNGE ACCESS
INTERLINING

Figure 5 Levels of cooperation between airlines within alliances

WILL the Merged Entity Likely Achieve the Claimed Efficiencies?

YES: Efficiencies are Verified

WOULD the Merging Firms Likely Achieve the Efficiencies Unilaterally?

NO: Efficiencies Are Merger-Specific

COULD the Efficiencies Be Achieved Unilaterally?

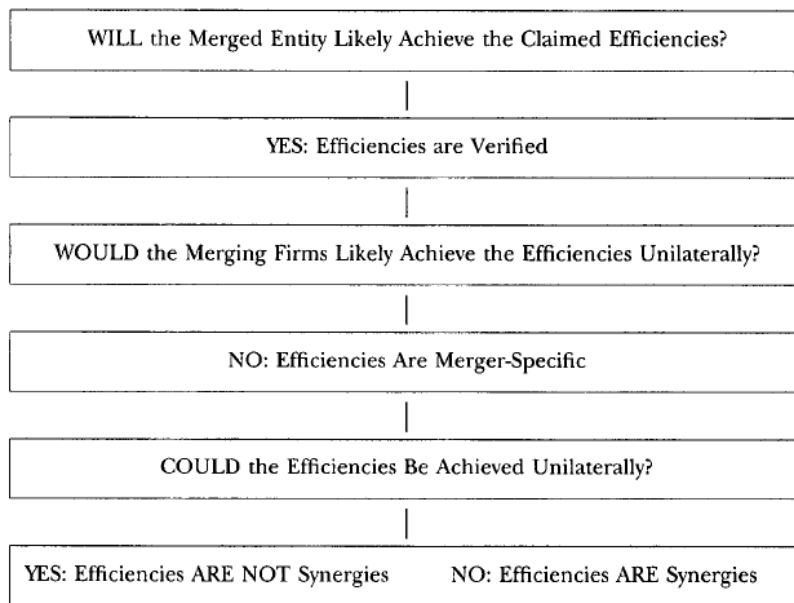YES: Efficiencies ARE NOT Synergies   NO: Efficiencies ARE Synergies

Figure 6 "Logic Tree for Merger-Specific Efficiencies & Synergies" (Farrell & Shapiro, Scale Economies and Synergies in Horizontal Merger Analysis, 2000)