Do Mergers and Acquisitions Add Shareholder Value? - An Empirical Event Study of the American and European Airline Industries

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Authors: Kyle Melton, Johan Sterner

Supervisor: Håkan Jankensgård

Abstract

This study investigates and compares the value added by merger and acquisition activity within the airline industries of the United States of America and Europe following the deregulation of each respective market. An abnormal return event study methodology was performed with three different event window lengths using a final sample of 64 public airline mergers. The focus of the study was on abnormal returns generated to shareholders of the acquiring firm. In the case of true mergers, where an acquiring firm could not be identified, a weighted average approach was adopted. To test the robustness of the results, the analysis was repeated using two alternate regional reference portfolios, which resulted in no significant changes in the underlying economic relationships. The findings infer a statistically significant positive abnormal shareholder return following airline mergers and acquisitions of 2.4%. The results also showed an American outperformance of approximately 1.4%, albeit with a lack of statistical significance.

Keywords*: airline industry, airline M&A, deregulation, consolidation, event study, market model, CAR, BHAR, merger value creation*

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1. Introduction

1.1. Background

Few industries in the world are more competitive and volatile than the airline industry. Historically, the sector has been plagued by unprofitability caused by revenue vulnerability, lack of capacity constraint, shocks to market demand due to economic and safety factors, and a highly complex cost structure that is heavily dependent on fixed labor costs and highly exposed to instable fuel prices (Manuela & Rhoades, 2014). Therefore, shareholders in the airline industry have traditionally been hurt more often then helped. A 2005 report by the U.S. Government Accountability Office highlights that there were over 160 bankruptcy filings in the U.S. since the industry was deregulated in 1978, with the industry as a whole losing over $30 billion in the 4-year period from 2001 - 2005 (Belt, 2005). As can be seen in Figure 1, similar struggles have been observed around the world in the last decade, with over 53 worldwide insolvencies in 2018 (Dutton, 2019).
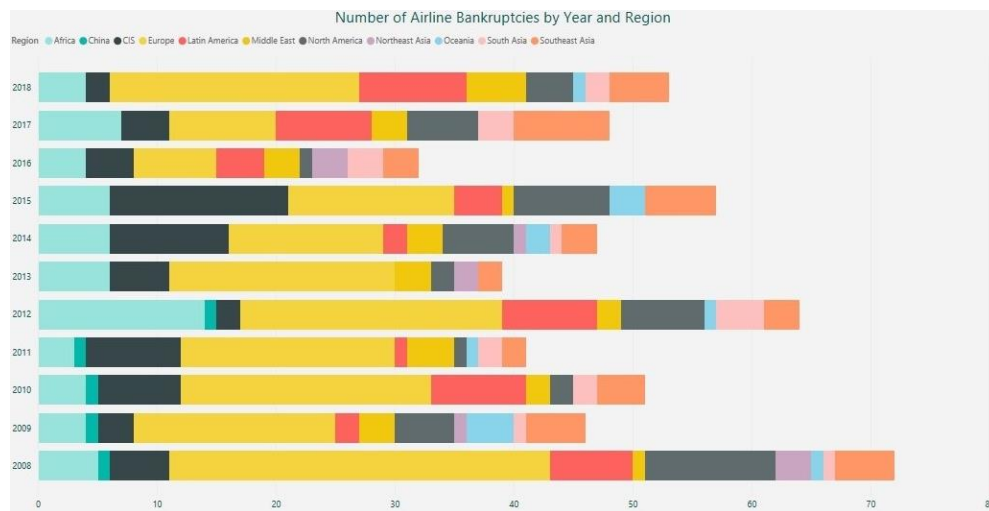
Figure 1: Airline Insolvencies

This continuous turmoil, coupled with substantial political deregulations, has led to widespread consolidation throughout the industry. Typically, companies pursue mergers and acquisitions for two main reasons: growth/expansion and the pursuit of synergies (Gaughan, 2007). For an airline, synergies can take the form of cost savings from collaborations on marketing campaigns, joint use of ground facilities, more efficient use of aircrafts, etc. (Bilotkach, 2007). In addition to their effects on operations, employees, and consumers,

mergers and acquisitions can have substantial effects on company profits and shareholder value. According to many studies, while the target firm tends to see positive returns after a consolidation event, on average these events tend to add little or no value to the acquiring firm's shareholders (Cogman, 2014; Moeller et al, 2005; Hackbarth & Morellec, 2008; Walker, 2000; Rehm & Siversten, 2010).

Furthermore, consolidation brings an additional benefit to the airline industry: a reduction of excess capacity. Constraining capacity allows existing carriers to more efficiently manage operating costs and charge fair market prices, driving consistently higher profits and margin improvements. According to Koeller et al (2015), "acquisitions that reduce excess capacity or put companies in the hands of better owners or managers typically create substantial value both for the economy as a whole and for investors". Therefore, the question of whether mergers and acquisitions create shareholder value specifically in the airline industry is of particular interest.

However, this question may not be generalized worldwide, due to substantial differences in the various markets throughout the world. Not all airline markets in the world are equal in terms of competition, regulatory environment, consumer demand, etc. The U.S. airline market presents a textbook environment to perform such a study. Before 1978, the government heavily regulated the U.S. airline industry, with the Civil Aeronautics Board controlling market entrants, routes, and fares (Kurash, 2015). The Airline Deregulation Act of 1978 brought this to an end, and the industry was soon flooded with increased competition and a sharp decline in prices, coupled with an increase in traffic. As more and more small airlines were unable to keep up with the strenuous demands of the competitive environment, consolidation commenced, and the number of carriers slowly began to decline. According to Fitch Ratings, 80% of the U.S. domestic market share today is held by the four largest carriers (Fitch, 2018).

But the U.S. is not the only market in which airline consolidation has been rampant. The European market went through a similar type of deregulation in the 1980s and 1990s. Traditionally, as air travel was seen as public service, the government was heavily involved in the ownership of the airline and made the primary decisions regarding routes and pricing. Starting with the removal of bilateral agreements between Britain and Ireland in 1986 and ending with the EEC regulation of 1992 which stated that any European carrier could offer service on any intra-European route effective April 1997, the European market was substantially deregulated (Pinkham, 1999). Following this deregulation, the European industry began to see consolidation trends similar to that in the United States, highlighted by mega-

mergers such as Air France/KLM and British Airways/Iberia. To further illustrate these consolidation trends, Figure 2 shows the number of completed deals by year in the respective markets.

Post-Deregulation Mergers & Acquisitions in American and European Industries
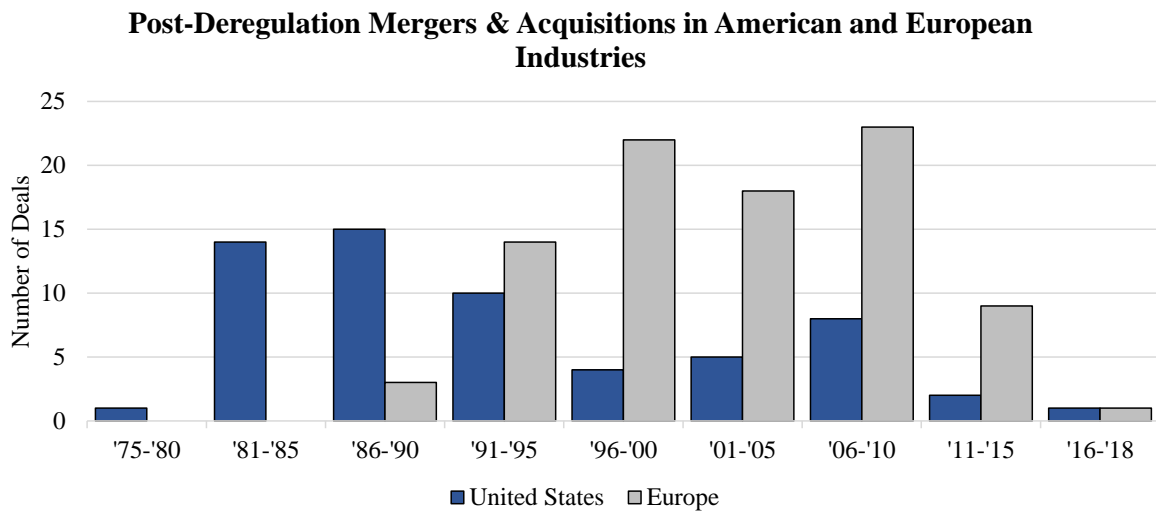
Figure 2: Post-Regulation M&A Deals

However, complexities still exist in the European market, which are not a factor in the United States. For example, instances of substantial ownership by governments still exist, such is the case with Air France-KLM and Scandinavian Airlines, which introduces a political aspect to corporate decisions. Additionally, ownership and control restrictions built into the bilateral air service agreements between countries contain nationality clauses, which require that airlines benefiting from the traffic rights are substantially owned and effectively controlled by nationals of the states in question (CAPA, 2017). These complexities present significant administrative challenges to cross-border mergers and acquisitions, which may inhibit the full realization of synergies.

1.2. Purpose of Study

Therefore, the purpose of this paper is to determine to what extent mergers and acquisitions add shareholder value in the airline industry, with a focus on how the U.S. and European industries differ. The previous research in this field has primarily focused on the U.S. industry, or on specific geographical markets, but to the author's knowledge no previous research exists comparing the value effects in the two markets directly. The study aims to provide insight into whether consolidation in this particular industry is beneficial to shareholders, indicating that what was once an "un-investible" industry may in fact be

attractive in light of recent consolidation[1]. Furthermore, the comparison of the two geographic industries is important considering the potential for further deregulation in the European market. The topic is relevant from an academic standpoint as well, as an empirical analysis of the effects of consolidation within this industry will add to the pre-existing literature surrounding the value impacts of mergers and acquisitions.

This study will assess shareholder value creation from the perspective of the acquiring company. The value generated for the shareholders of the acquiring firm is of particular interest in order to gauge the success of merger and acquisition integration and the long-term viability of the deal. Although the value generated to the target shareholders is often substantial and relevant, a study of these affects would more answer research questions regarding deal premiums and overpayments. Furthermore, the study aims to assess value creation as determined by analyzing stock price reactions from the days leading up to merger announcement to a subsequent period after the announcement of the merger or acquisition. Varying lengths of post-announcement event windows will be used, with the hopes of capturing the true value of the deal as information becomes available. This is motivated by the information lag that comes with merger announcements in the airline industry. Because of the strict anti-trust laws and other legal regulations, it is often unclear whether a merger will be approved or not, or whether specific conditions will be imposed. It sometimes takes several months for these decisions to be made by the respective regulatory boards. Therefore, the initial stock price reaction may not be inclusive of all relevant information surrounding the merger, information that will not become available until a later date. Using a wider event window will allow the study to capture these information lags and assess the true value of the merger and acquisition once the deal is more likely than not to occur. From a technical perspective, mergers and acquisitions will be treated in the same manner, although each type of transaction has a distinct definition and characteristics that make it unique.

The focus on U.S. and European airline mergers and acquisitions means that airlines based outside the geographical boundaries of the United States of America and Europe will be excluded from this study. European airlines are defined as airlines based in the 28 EU member states as well as Switzerland, Norway, and Iceland. Furthermore, the shareholder value perspective restricts the study to public acquirers, thus the effects of deals performed by private companies will not be included. Without a publicly traded share price, it would be substantially

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[1] Warren Buffet called the airline sector a "death trap for investors" at Berkshire Hathaway's 2013 annual shareholder meeting. Buffet's sentiment has recently changed, as Berkshire is currently major shareholders in both Delta Air Lines and Southwest Airlines.

more difficult to calculate value impacts pre- and post-event. However, cases in which the target is privately held will be included in the analysis.

The study will also be limited to merger and acquisition events that occurred after the respective deregulations of each market (1978 for U.S.; 1989 for Europe). Any deals before this time could have been driven by regulators or governments, and are not of particular interest to a study based on free-market economics. Furthermore, the analysis is limited to only mergers and acquisitions within the above specified criteria that have sufficient stock return data available to be able to adequately perform the analysis.

The remainder of this paper is organized as follows. Section 2 discusses the theory surrounding mergers and acquisitions, as well as economic theories that are relevant to the topic. The section also includes a brief literature review of other relevant studies that have been performed on similar topics. Section 3 formulates two hypotheses addressing the intended research questions. Section 4 discusses and motivates the empirical method chosen and lays out a description of the data and data gathering process. Section 5 presents the findings of the study and a discussion of the results. Finally, section 6 concludes and proposes suggestions for future research in this field of study.

2. Theory

The effects of mergers and acquisitions (M&As) have historically been a popular research topic and there is extensive literature dealing with M&As and value creation. This chapter will start off with some simple definitions and thereafter focus on the motives behind M&A activity. Furthermore, previous research on the effects of airline M&As on shareholder value will be discussed, along with the impacts of cross-border M&As. Finally. other relevant factors to consider for this study will be addressed, such as monopoly theory and the effects of anti-trust legislation.

2.1. Classic Merger and Acquisition Theory

Mergers and acquisitions can refer to several types of corporate transactions such as mergers, consolidations, and takeovers, with the terminology sometimes being used interchangeably. The underlying rationale for M&A deals is usually to add value for

shareholders. An acquisition can create value if the cash flows from the merged company exceed those of the merging companies on a stand-alone basis (Koller et al, 2015). There is also a managerial aspect to M&As in that as businesses and markets develop, one set of managers who may have been well-suited to run the business in the past, might need to be replaced and the assets they managed reallocated to another management team. To this end, M&As are a way to achieve this transition in a timely and sensible manner (Koller et al, 2015). This concept that businesses have differing values depending on who is managing them is known as the Best Owner principle. In M&A deals, the value gained for the acquirer equals the difference between the value received from the transaction and the price paid for it. It is therefore crucial for the acquirer to not overpay if value creation is to be achieved (Koller et al, 2015). In order to increase the value of the combined or merged company, the transaction usually aims to obtain one or more of the following objectives.

2.1.1. Growth

M&As can be one way to increase the growth prospects of a company, especially in mature industries when organic growth is slow or hard to achieve. M&As might also be used as a tool for geographic or international expansion, often times proving to be a faster and less risky way to gain access to new markets than through organic growth (Gaughan, 2007). In the U.S. airline industry, M&As are often a source of expansion within the borders of the U.S., giving airlines broader access to new routes and increasing the company's geographical presence. Recently, the industry has seen an influx of international strategic alliances and joint ventures, which is an alternative way of increasing international exposure without committing to a full merger or acquisition.

2.1.2. Synergies

Synergy, in an M&A context, refers to the concept that the combined company can achieve greater efficiencies than the two stand-alone companies could achieve on their own. It is the concept that the whole is greater than the sum of its parts - that one plus one equals three (Gaughan, 2007). Synergies can be divided into operating synergies and financial synergies. Operating synergies can be achieved on both the revenue and cost side. Revenue-enhancing

synergies include opportunities such as cross-marketing between the two companies, integration of customer facing platforms, or the sharing of brand names and market reputation. Cost-reducing synergies, often highlighted in mergers as they are usually easier to estimate, can come in the form of economies of scale, where an increase in the company's scale of operation results in lower per unit costs, or economies of scope, in which the company can broaden the product and service offering (Gaughan, 2007). Specifically in the airline industry, synergies could include increased flight destinations or customer benefit program offerings. Financial synergies refer to the positive impact M&As have on the cost of capital of the acquiring or merging firm. Larger companies can typically expect a lower cost of capital, as they enjoy better access to financial markets and are perceived as less risky, which in turn lowers borrowing costs (Stulz, 1996).

2.1.3. Diversification

Another strategy is to diversify through M&As and expand outward from the company's current core competency and product offering. This may be done in order to enter a more profitable industry, or as a way for companies to acquire a leading position in a certain business area (Gaughan, 2007). Diversification may also help reduce earnings volatility and improve dividend stability, since a diversified company has access to more cash flow streams spanning different business areas (Gaughan, 2007). In the airline industry, diversification is not a common strategy. However, some passenger airlines do choose to expand into related industries such as cargo services. A unique example of diversification and vertical integration in the airline industry is the case of Delta Air Lines, which in 2013 purchased an oil refinery in order to create a natural hedge on their input costs. However, as these types of deals are rare and are not the purpose of this study, they will not be explored further.

2.1.4. Improved Competitive Behavior

Highly competitive industries might see consolidation through M&As as a way to restrain price competition, thereby increasing the return on capital for the remaining companies within the industry (Koeller et al, 2015). However, empirically it has been shown that an industry needs to consolidate down to three or four companies and succeed in keeping new

entrants out in order to change competitor pricing behavior (Koeller et al, 2015). The airline industry seems like a perfect example for this type of M&A motivation. As mentioned before, the U.S. industry has consolidated down to 4 major carriers, and Europe has begun a similar trend. In a 2003 report, the Economist mentioned that in a world of global deregulation, it is not unrealistic to see a U.S./European airline industry with only 3 major players (Economist, 2003).

2.1.5. Removing Excess Industry Capacity

Maturing industries typically develop excess capacity from the combination of higher production from existing industry participants, and additional capacity from new entrants (Koeller et al, 2015). When facing an excess capacity issue, companies often find it easier to reduce capacity from a larger entity in conjunction with an M&A transaction, than to unilaterally rein in their own unproductive capacity (Koeller et al, 2015). Excess capacity in the airline industry will be further discussed in section 3.

2.1.6. Undervaluation

The acquisition of companies valued below their intrinsic value is another driver of M&A activity. This approach to investing decisions is favored by the adherents of value-investing who search for undervalued companies or ones that have been suffering from recent sell-offs in the market (Damodaran, 2012). Therefore, companies with weak share price developments can become targets for M&A activity. Market valuations tend to revert to intrinsic values over longer time horizons, but can temporarily misvalue individual assets, for example by overreacting to negative news (Koeller et al, 2015). Of course, acquirers must be wary of the fact that companies can be temporarily overvalued as well. One danger associated with this approach is when the company in question attracts multiple bidders, forcing the acquisition premium higher through a bidding war. This is referred to as the winner's curse, proposed by Varaiya (1988), whereby the party that estimates the highest value of the achievable synergies wins the auction and ends up overpaying for the asset. Historically in the airline industry, many M&A deals arise out of bankruptcies, when an acquiring firm can take advantage of low valuations to consolidate a struggling airline into their existing operations.

2.1.7. Managerial Behavior Motives

A related problem to the winner's curse mentioned above is the hubris hypothesis laid forward by Roll (1986). It highlights hubris or pride of the acquiring firm's management as an explanation for the M&A transaction. According to the hypothesis, the personal motives, rather than purely shareholder value maximization, dictate the transaction and bidding process where an overconfident management team thinks it can realize larger synergies than the market. Later studies have tested Roll's hubris hypothesis empirically and found some support for it. Limmack (1993) concluded that bidders in contested bids earn significantly negative returns but could not tie it to increased hubris as his control group also experienced negative returns, albeit smaller in magnitude. A more recent study by Hayward & Hambrick (1997) focused on the relationship of CEO hubris and acquisition premiums and found a highly positive relationship, and also a negative relationship between CEO hubris and acquiring firm shareholder wealth following the acquisition. Hayward & Hambrick concluded that CEO hubris has substantial real-life consequences for shareholder's wealth. While investigating cross-border acquisitions of U.S. firms, Seth, Song, & Petit (2000) found support that managerial hubris was an important factor behind the transactions and that the hubris hypothesis co-exists with the pursuit of synergies.

Another phenomenon of managerial behavior is known as empire building, which describes managers desire to enlarge the entity they are managing. Empire building and its impact on M&A decisions have been studied by Harford & Li (2007), who found that CEO compensation increased after mergers, and that the increases were irrespective of the outcome of the transaction. Furthermore, Harford & Li conclude that the enlargement of the entity managed provides the managers with leverage to increase their compensation, which is not the case when managers conduct large capital expenditures. Therefore, managers have a financial incentive to enlarge the entity under their management through M&A.

2.2. Other Theoretical Factors of Airline Consolidation

In addition to the extensive literature related to the motivations behind corporate mergers and acquisitions, there are other economic theories that are relevant to the topic of study. The deregulation and subsequent establishment of a free market pricing in the airline

industry provide textbook examples of economic phenomena and supply and demand economics.

2.2.1. Competition and Monopoly Theory

After the deregulation in the United States in 1978, there was a flood of new entrants to the market, which created an epidemic of over-supply and drove down prices. However, due to the high fixed and variable costs associated with running an airline, many firms could not survive in this low-price environment, and subsequently failed or were acquired. This has led to a constriction of competition within the airline market. Subsequently, the airline industry has undergone consolidation on both sides of the Atlantic. In the U.S., major mergers like Northwest and Delta in 2008, United and Continental in 2010, and American and US Airways in 2013 have paved the way. In Europe, Air France and KLM merged in 2004, Lufthansa acquired SN Brussels and Austrian Airlines in 2009, and British Airways merged with Iberia in 2011.

As the markets have contracted, particularly in the United States market, some have argued that the industry has taken on monopolistic characteristics (Mueller, 2006). Monopoly theory posits that in the absence of competition, a firm can unilaterally set prices above what is deemed as a market rate (Mansfield, 1979). Therefore, in theory, it is in the interest of airlines to engage in M&A activity, in order to remove competition from the industry, allowing them to charge higher prices and generate higher cash flows and sustainable profits.

2.2.2. Anti-Trust Environment

In order to combat these monopolistic trends, regulatory boards often get involved in M&A deals between large corporations. Anti-competition legislation can get involved, either through conditional terms imposed on the transaction or by banning it all together. In his review of the current state of airline competition law in the U.S. and the E.U., Fones (2014) examines what the authorities look for in an airline merger and the many ways in which government can interfere with the market process. Below is a brief step-by-step summary of Fones's review of what authorities consider when ruling on consolidation.

<u>Define a Relevant Market:</u> The legislators will first define a relevant market affected by the proposed consolidation. This relevant market is disaggregated into a product market and a geographical market, which in the airline industry tend to blend together and the relevant market is usually defined as air travel between the originating and destination city.

<u>Concentration:</u> The level of competition, or concentration of industry actors are usually measured with the HHI. Markets with an HHI of under 1500 are viewed as unconcentrated and markets above 2500 as highly concentrated.

<u>Competitive Effects:</u> Estimating the likely effect of the increased concentration on prices and output. Authorities evaluate potential "unilateral effects" where competition in the relevant market is eliminated due to the merger. Also "coordinated effects" are evaluated, in which, post-merger, the merging parties and their competitors would be able to coordinate their behavior in an anti-competitive manner.

<u>Entry:</u> Authorities consider the prospect of new entrants, whether they would be sufficient to ensure competitive markets and if the new entrants would be profitable at pre-merger prices. Specifically of interest are entry barriers such as airport access and whether or not potential new entrants may not be able to enter because of lack of airport slots or other limiting factors. A common way to handle this is to condition the merger approval upon divestment of airport slots at constrained airports to competitors.

<u>Efficiencies</u>: Authorities consider efficiency gains specifically attributable to the proposed merger. These must be well-defined, verifiable, and benefit the consumer.

<u>Failing Firms and Assets</u>: An otherwise unacceptable merger might receive approval if the merging parties can demonstrate that either of them is a "failing firm". The logic behind this is that an anticompetitive acquisition will not harm competition if the target would exit the relevant market

absent the transaction. A failing firm is one with the following characteristics: i) in imminent failure, ii) cannot successfully reorganize in bankruptcy, iii) where there is no reasonable less anti-competitive purchaser for the firm or assets.

These considerations may result in authorities insisting that airlines divest certain assets such as airport slots, gates, and related ground facilities before approving a merger. The authorities also reserve the right to approve the purchaser of the divested assets. All of these restrictions can increase the uncertainty and decrease transparency regarding airline M&A transactions, both in terms of whether or not the announced merger will go through at all or how the approved merged entity will look like and what concessions will have to be made.

As a side note, it should be noted that the price effects of airline consolidation for consumers, including collaborations who were granted antitrust immunity, have been shown to be positive by a number of studies, putting the effectiveness and necessity of anti-competition law into question. Brueckner & Whalen (2000) showed that international airline alliances have had a reducing effect on fares, concluding that the alliance partners charged fares 25% below that of non-allied airlines on interline flights[2]. The results were in line with later research from Brueckner (2003), who found that code-sharing[3] and also, perhaps more interestingly, that antitrust immunity both reduces the fares of interline flights with the combined effect amounting to a 17% - 30% reduction. In his dissertation on international airline competition and consolidation, Bilotkach (2005) evaluated interline fares on three measures of cooperation: code-sharing, member of an alliance, and antitrust immunity. The author found that code-sharing had the largest impact with a 22.5% reduction over non-consolidated airlines, while alliance membership also lowered interline fare with up to 10%. However antitrust immunity was found to have no significant effect on fares, instead suggesting that connecting the carriers' network is the strongest driver of fare reductions. In a more recent follow-up study on the effects of international airline cooperation on airfares, Brueckner et al (2011) looked at panel data up to 2009 and largely confirmed previous results that code-sharing, alliances, and antitrust immunity each separately reduces interline airfares. The study showed a fare decrease of 11.2% in interline fares for fully cooperative airlines compared to traditional interline services. Furthermore, the results show that alliances with "perfect" cooperation defined as

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[2] An interline flight is an agreement between two airlines to allow seamless travel on two or more airlines within the same trip. This enables passengers with multi-stop trips on different carriers to not have to collect their bags after each leg.
[3] Code-sharing refers to the practice by which one airline sells tickets on a partner airline's flights through their own booking platform. The ticket is sold by one airline, but operated by another.

code-sharing, alliance, antitrust immunity, and a single carrier providing itinerary services have no more expensive fares than unimmunized alliances. These results are not consistent with the stated purpose of anti-trust legislation of protecting the interest of consumers.

2.3. M&A Literature

2.3.1. General M&A effect on Shareholder Value

This study focuses on the returns to acquiring firms and the existing literature suggests that there is little to no value creation to be expected to the acquirer, at least in a broad, pan-industry, setting. Walker (2000) researched the shareholder wealth effects of acquiring firms using a sample 278 acquisitions from 1980 to 1996, Walker found cumulative average returns of just 0.8% to the acquiring firms. Hackbarth & Morellec (2008), who studied announcement returns to acquirers using a broad sample of 1,086 deals spanning all industries excluding financials from 1985 – 2002, found a cumulative average return of -0.5% to acquirers compared to 18.2% to targets. Moeller et al (2005) found similar results with an even bigger sample of 12,023 U.S. transactions from 1980 - 2001 where the cumulative average return to acquirers amounted to just 1.1%. David Cogman from McKinsey Research (2014) shows that while in the most recent decade, acquirers are starting to earn positive returns, traditionally acquisitions have been value destroying, with an average return of -4.4% since 1999. Furthermore, Rehm & Siverstein (2010) show that on average between 1997 – 2010, 62% of deals exhibited a negative market reaction for the acquirer after a deal announcement.

2.3.2. Airline M&A and Effect on Shareholder Value

The impact of M&As on shareholder value in the airline industry has also been researched to an extent. An event study made by Cortés et al (2015) provides evidence from Latin American airline M&As. The study looked at M&A announcements for publicly traded Latin American airlines from the period between 1996-2013. Using an accumulated abnormal returns approach, the authors found that non-strategic mergers delivered negative abnormal returns but noted the long-term effects of M&As are unknown. The results suggest that investors value

strategic integration and synergy creation rather than M&As forced through fire sales or as part of bankruptcies and restructurings.

Manuela & Rhoades (2014) researched short-term value effects from the U.S. where the mergers of America West and U.S. Airways, Delta and Northwest, and Continental Airlines and United Airlines were examined. The event study with a 121-trading day observation window showed mixed results for announcement dates but generally positive results on completion date for both acquirer and target airline, outperforming their indices in the short-term. These results indicate that the market perception improves as uncertainty regarding the merger diminishes.

In research on the European airlines, Hsu & Flouris (2016) studied the returns of European giants Lufthansa, Air France-KLM, and Iberia-British Airways (IAG) during the period 2009-2013, a period of heavy consolidation within the industry. The three airlines mentioned constitute the largest airlines in Europe measured by traffic and market capitalization. Examining dependencies between daily stock returns and trading volumes using the GARCH-EVT Copula method, Hsu & Flouris concluded that merger announcements were value creating in most cases and noted peaks in daily returns around merger dates, regulatory approval of previously announced mergers, dates with rumored mergers, and dates around merger negotiations among the concerned airlines.

2.3.3. Border Effects in M&A

The geographical differences in M&A activity between the U.S. and European markets were examined by Schosser & Wittmer (2015), who found that synergies realized within the first two years of the merger are higher in the U.S. market than in the European market. Using a sample of six high-profile mergers the authors found that European airlines were able to realize 31% of the anticipated synergies in the first year, compared to 50% for American airlines. The American outperformance persisted into year two as well, as the European airlines had realized 75% compared to 114% for their American counterparts. The authors cited higher cost structures in the European markets and lower synergy potential from cross-border M&A complexities. This is also evident in the companies' overall synergy estimates between the markets, with the estimated European market synergies at an average of 2.6% of combined pre-merger revenue, compared to 3.7% for the U.S. market. This point is further made by the authors with the comparison of the Delta/Northwest and IAG mergers, which both combined

two same-alliance airlines. While Delta overachieved relative to their synergy target, IAG was unable to meet expectations. Schosser & Wittmer note the important distinction between the two mergers is that the IAG merger was a cross-border merger, but they leave it up to future research to conclude on this characteristic's impact on synergy realization.

The European border effect has been researched further by Umber et al (2014) who analyzed M&As in Europe from 1991 to 2007 and compared them to ones in the U.S. market. The authors looked at completed and geographically coded mergers and acquisitions within the 15 EU member states present in 1995. The study found that national borders constitute a significant barrier to M&A activity. Moreover, Umber et al (2014) found that the negative border effect on transactions has not decreased significantly between the years 1992 and 2007, which the authors described as "a rather disappointing picture of European integration, at least with regard to the market for corporate control" (Umber et al, 2014). The study compared the results of these European mergers to ones in the U.S., a single-country, single-language market as a benchmark. Although the United States is one country, some regulatory differences do exist in the U.S. at the state-level and as such, equivalent cross-border effects can be present (Bebchuk & Cohen, 2003). Using defined quasi-borders for the U.S. market, Umber et al found significant results that overall U.S. quasi- borders do restrain M&A investment to some extent, but that the negative effects in the European countries were three times a large. Factors such as common legal systems, cultural distance, and geographical distance all have an impact on M&A transactions and there are clearly more discrepancies between these factors in Europe than in the United States. Looking at the development of the restraining effect of the cross-border aspect on M&As over time, the authors found that the European border effect has decreased by 17.2% since 1992, compared to a decrease in the U.S. border effect of 43.2% for the same time period. The results imply that the EU has some way to go in catching up to the U.S in terms of economic integration.

3. Hypothesis Formulation

3.1. Hypothesis 1: Value Creation of Airline M&As

One of the unique characteristics of the airline industry that has been a consistent driver of unprofitability is the existence of excess capacity in the market. Capacity in the airline market is usually defined using the common metric "load factor". Load factor is defined as the

percentage of seats sold to passengers out of the total seats available to passengers on all routes an airline has flown. In 1978, the year of deregulation in the United States, U.S. carriers had average load factors in the range of 50% – 60% (Baltagi et al, 1998). By contrast, in 2018 the average load factor amongst U.S. carriers was 82.5% (IATA, 2019). The European market was not far behind, at 81%. This drastic change implies that throughout the years, a driving factor of the consolidation efforts in the United States and Europe has been a removal of excess capacity, allowing demand to catch up to supply.

The cause of excess capacity in the airline industry has been explained from multiple viewpoints. Tirole (1988) proposed that excess capacity served strategic purposes, stating that firms use it as a barrier against new entrants. There is also a large body of literature linking excess capacity to demand uncertainty in the industry (Gabszewicz & Poddar, 1997; Borenstein & Rose, 2007; Berry & Jia, 2010; Escobari & Lee, 2014). Douglas and Miller (1974) on the other hand argued that excess capacity existed because of the inability of airlines to compete on price. The authors predicted that in a post-deregulation environment, the problem of low load factors would disappear. A later study by Baltagi et al (1998) supported this hypothesis, showing that capacity utilization as measured by three different metrics increased dramatically in the years following deregulation in the U.S. market. The same study also shows that excess capacity can be costly in the airline industry, concluding that deregulation enabled U.S. airlines to increase their capacity utilization and thereby dramatically reduce their average costs (Baltagi et al, 1998). According to Dana & Orlov (2009), a 6.7% increase in capacity utilization translates into $2.7 billion in annual cost savings to U.S. carriers.

Many studies in the existing literature have shown that mergers can be a successful way to remove excess capacity from an industry. When faced with overcapacity in the industry, firms tend to find it easier to acquire a competitor and shut down their operations, rather than reduce their own capacity from within (Koeller et al, 2015). As further support, in a study of what drives merger activity, Andrade & Stafford (2004) find that in times of reduced capacity utilization, industries tend to consolidate through mergers and acquisitions. Furthermore, Maloney & McCormick (1988) find that mergers that aim to consolidate cyclically idle capacity result in a reduction of cash flow volatility, which in turn allows firms to invest in their operations with more certainty.

Therefore, given the above-mentioned studies that show that deregulation in the airline industry has led to a reduction of excess capacity, and that the reduction of excess capacity typically adds value in the context of mergers and acquisitions, this study aims to test the following hypothesis (H_1):

3.2. Hypothesis 2: Geographical Differences in Value Creation

While European airlines should be able to benefit from similar trends, and the rate of consolidation in the European market is catching up to its American counterpart, there are still many hurdles in Europe that may pose a threat to successful merger integrations. The cross-border nature of European mergers adds legal complexities that may sometimes deter consolidation, or at least inhibit the companies' abilities to achieve the full realization of synergies.

In his odyssey of dos and don'ts in M&A deals, appropriately titled "Deals from Hell", Robert Brurner (2009) notes that cross-border M&As, on average, involve a higher takeover premium than domestic M&As. The author argues that this is compensation for localized market knowledge and access, but also for entry into a new regulatory regime. Of course, higher takeover premiums increase the risk for value destruction to the acquiring firm. The historical propensity for larger takeover premiums in cross-border transactions is one of the reasons that the value creation from airline M&As might differ between the more homogenous U.S. market and the more regulatory diverse and multi-national European market.

Another distinguishing feature between the two markets is the presence of state-owned enterprises (SOEs) in the European market. Previous research done by Del Bo et al (2016) on a global scope has found that transactions involving SOEs involve acquirers with different characteristics than private-to-private transactions, and that the results hold regardless of whether the SOE is on the selling or buying side. Del Bo et al (2016) looked at a number of characteristics such as solvency ratios, total assets, return on equity, and operating revenues to distinguish firms within the data set. While leaving the impact on shareholder returns of SOE transactions unanswered, the insight that transactions involving an SOE involves a significantly different type of counterpart will likely have an impact on this study as there are no SOEs present in the American airline market for the duration of the period covered in this study.

Bortolotti et al (2015) have tried to answer the question of whether transactions involving SOEs create more or less shareholder value. Researching the transactions of sovereign wealth funds using an abnormal returns event study approach, Bortolotti et al (2015)

found that SOE transactions achieve, on average, positive abnormal returns, but they underperform private sector transactions[4]. Although the authors take a broad approach and research a global, pan-sector data sample, the results can be extended to government owned airlines, providing further reason to suspect differences in shareholder returns between the sub-samples of European and American airlines.

Furthermore, one of the most notable legal inhibitors in European airline consolidations resides in the ownership and control laws that are imbedded in the bilateral treaties between the EU member states. The ownership rules set a limit to the percentage of foreign ownership of the voting equity share capital of airlines (CAPA, 2017). The amount varies by region, but in the EU, this limit is set to 49%. This means, if one airline wants to purchase another, they must ensure that the ownership structure is set up in such a way that the domestic owners of the target airline still own more than half of the airline. This does not fully inhibit cross-border transactions, obviously, but it does force the acquiring company to spend extra time and resources on setting up sometimes complex organizational structures. For example, when British Airways and Iberia Air merged in 2011, they formed one consolidated company named International Airlines Group (IAG). Although both companies are wholly owned by this new group, holding companies were set up in the respective countries, Great Britain and Spain, in order to ensure compliance with these ownership laws. This adds considerable complexity to the transaction, which is another factor influencing the success or failure of the M&A (Bruner, 2009).

These legal considerations along with the empirical results presented, namely that of Schosser & Wittmer (2015) who showed that cross-border transactions have a negative effect on synergy realization relative to domestic, and Umber et al (2014) who highlight the inhibiting barrier effect that national borders create when engaging in M&A transactions, leads to the second hypothesis (H_2):

H_2: European airline mergers and acquisitions add less shareholder value than American airline mergers and acquisitions do

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[4] Private sector transaction here refers to transactions not involving a sovereign wealth fund. The benchmark sampling study consisted of publicly traded targets.

4. Method and Data

4.1. Event Study Methodology

The prevailing choice of method among the empirical finance literature when studying the value impacts of a particular event, such as a merger or acquisition, is an event study. Introduced in 1969 by Fama, Fisher, Jensen and Roll, the event study method assesses the stock price performance of a given company in the days surrounding an event and compares these prices to what the stock would be expected to earn given normal conditions and no event occurrence. The key assumption in an event study is the efficient market hypothesis, which states that as soon as information becomes available, it is immediately priced into the stock price (Fama, 1965). In fact, the event study methodology was first developed to test the efficient market hypothesis and was later repurposed to assess company value in the 1970s (Salinger, 1992). The link to corporate value lies in the assumption that stock prices are a reflection of the value of the firm, as they represent the present value of future free cash flows and integrate all available information (Fama, 1965; McWilliams & Siegel, 1997).

The basic concept of an event study is to monitor a certain stock's performance over a pre-determined time horizon, known as the event window, and compare the performance versus how the stock was expected to perform under normal, no-event conditions. The challenge then, is predicting what the normal return would have been. There are many methods employed for this step, most of which involve using past performance in a pre-event window, or estimate period, and using that to predict hypothetical future performance within the event window. The estimate period is often times in the days leading up to the event but must be before any possible leakages relating to the event. MacKinlay (1997) recommends using an estimation period of 120 days prior to the event. A visual representation of the event study methodology is presented below.
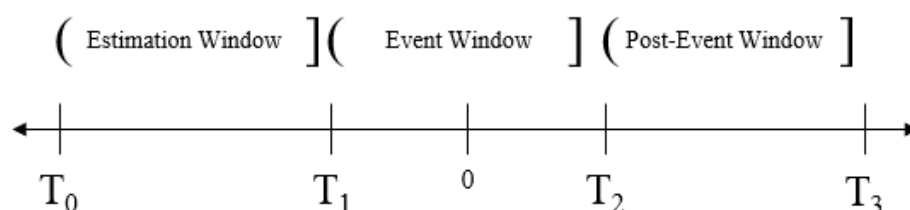

Figure 3: Event Study Timeline

Event studies can be used to assess both short-term and long-term stock performance. McWilliams and Siegel (1997) argue that for an event study, the event window should be as short as possible given that longer event windows yield less statistical significance and can lead to confounding effects. Ryngaert & Netter (1990) show empirically that short event windows will usually capture the significant effects of an event. Furthermore, as the event horizon gets longer, it becomes harder to attribute abnormal returns to the specified event, as opposed to other factors that may be occurring. This can be particularly troublesome in the airline industry, which is cyclically volatile and exposed to significant stock price shock events, such as corporate bankruptcies.

However, it has been suggested that certain types of events, including corporate mergers, may have delayed stock price reactions, with abnormal performance persisting for several years after an event's occurrence (Kothari & Warner, 1997). Particularly, in the airline industry, mergers are subject to strict anti-trust review, the uncertainty of which can cause significant information lags. This is further supported with studies by Womack (1996) and Dichev & Piotroski (2001), who show that markets can respond differently over varying time horizons to different types of news. Therefore, this study will employ multiple event window lengths to assess stock price performance, with the longest window extending to two months post-announcement, with the hopes of capturing these delayed effects.

4.2. Methods for Assessing Normal Returns

The basis for any event study resides in assessing abnormal return, or how a particular stock performs in relation to how it was expected to perform under a no-event scenario. In general, the abnormal return for any stock i with an event date t is equal to:

$$Abnormal\ Return_{i,t} = R_{i,t} - E(R_{i,t})$$

where $R_{i,t}$ is the actual return of the asset and $E(R_{i,t})$ is the expected return. There are many different methods in the literature for how to assess expected performance, of which four are most common: the market model, the market adjusted model, the capital asset pricing model (CAPM), and the Fama French three-factor model (FF). Each model is presented below, along with the most notable benefits and drawbacks.

4.2.1. Market Model

The market model is one of the most commonly used models to estimate normal return in an event study (MacKinlay, 1997). Introduced by Harry Markowitz in 1959, the market model uses a specific stock's performance relative to the market outside the event window to predict the expected returns during the event window, given the market's performance during the same time. The market model formula for expected performance for any stock *i* at time *t* is given by the formula:

$$E(R_{i,t}) = \propto_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

where $R_{i,t}$ and $R_{m,t}$ are the returns at time *t* for the given stock *i* and the market respectively, and the expected value of the residual $E(\varepsilon_{i,t})$ is equal to 0. The β_i is the beta of stock *i*, or its sensitivity to changes in the market, and the $\propto_i$ is the intercept coefficient. According to Fama (1998), the market model is good to use when estimating firm specific returns, but should not be used to identify anomalies in the cross-section of average returns. Furthermore, multiple studies show that the market model produces results that are not substantially different from more sophisticated statistical models (Brown & Warner, 1985; Campbell et al, 1997). However, many articles point to the fact that using OLS methods to estimate beta in the market model can lead to biased, or at least inefficient, estimates (Wise, 1963; Scholes & Williams, 1977; Dimson, 1979).

4.2.2. Market Adjusted Model

Barber & Lyon (1997) recommend using the market adjusted model, which is a simplified version of the market model method and assumes no idiosyncratic risk and perfect correlation with a particular tracking index or control firm. The market adjusted model recommends estimating the expected return using either a reference portfolio, a control firm, or the Fama French asset pricing model (Barber & Lyon, 1997). Although the use of reference portfolios can be convenient due to available tracking indices, the authors caution that their use can lead to misspecified test statistics arising from new listing biases, rebalancing biases, and skewness. They instead urge the use of control firms to estimate expected returns to adjust for these biases.

4.2.3. Capital Asset Pricing Model and Fama French Three-Factor Model

The Capital Asset Pricing Model (Sharpe, 1964; Linter, 1965) is an economic model that is an extension of the traditional market model. In the CAPM, a stock's performance is function of the risk-free rate of return, the stocks volatility compared to the market, and a market risk premium.

$$E(R_{i,t}) = R_{f,t} + \beta_i (R_{m,t} - R_{f,t}) + \varepsilon_{i,t}$$

Despite its widespread use in the 1970s, researchers have found that the CAPM imposes unnecessary restrictions on the market model that jeopardize the validity of the results (MacKinlay, 1997).

To counter the anomalies and shortcomings found in the CAPM, Eugene Fama and Kenneth French developed the Fama French Three-Factor model in the 1990s. This model argues that expected return is not only a function of the market return, but also of the outperformance of small firms versus big firms and high-book-to-market firms versus low ones (Fama & French, 1996). Specifically, the model can be written as follows:

$$R_{i,t} - R_{f,t} = \propto_i + \beta_i (R_{m,t} - R_{f,t}) + S_i(SMB_t) + H_i(HML_t) + \varepsilon_{i,t}$$

where $R_{i,t} - R_{f,t}$ is the stock's excess return, $R_{m,t} - R_{f,t}$ is the market's excess return, SMB_t is the excess return of small market capitalization firms over big ones, and HML_t is the excess return of high book-to-market over low book-to-market firms. In addition to the complexity that the model adds (leading to survivorship biases in data collection), it has been criticized for the unrealistic assumptions that there is no interaction between the three factors, and that the three factors do not change over the event window (Barber & Lyon, 1997; Barber, Lyon, & Tsai, 1999).

4.3. Methods for Calculating Abnormal Returns

The typical short-term event study assesses stock price performance in the days surrounding the announcement of a merger or acquisition. A typical event window in the literature ranges from one-to-three days before the event to one-to-three days after the event

(McNeil & Moore, 2005; Hanson & Song, 2000; Allen & McConnell, 1998, etc.). In the case of mergers and acquisitions, the event is typically the public announcement of the deal. This methodology puts a lot of trust in the efficient market hypothesis, which posits that markets instantaneously price in new information with accuracy and unbiasedness. However, some caution that the use of such a short event window can lead to erroneous conclusions (Hendricks & Singhal, 2001) and can pick up positive heuristic biases in market reactions (Oler et al, 2008). Also, as mentioned above, in the case of airline mergers, not all necessary information is immediately available at the time of announcement. Therefore, this study aims to perform the classic short event window study, but also extend the event window to the two months following the announcement date, with the hopes of capturing all relevant information.

When calculating abnormal returns, different methodologies must be used that capture the compounding effects of stock returns. The two prevailing methods that are used are the cumulative abnormal returns (CAR) method and the buy-and-hold abnormal returns (BHAR) method. Both methods can be used to assess performance of stock returns over a longer time horizon as well. However, Barber, Lyon, & Tsai (1999) acknowledge that the two methods should be used to answer slightly different questions. While the CAR approach should be used to answer the question of whether sample firms consistently earn abnormal returns, the BHAR approach should be used to assess performance over a specific time horizon. The difference between the two methods comes down to arithmetic versus geometric sums, with the BHAR method capturing the compounding effects a stock holder typically receives.

The CAR method for assessing performance can be represented using the following formula:

$$CAR_{i,t} = \sum_{t=1}^{\tau} Abnormal\ Return_{i,t}$$

where abnormal return is defined in the same way as before, or actual return less expected return. The BHAR method, in contrast, is expressed as follows:

$$BHAR_{i,t} = \prod_{t=1}^{\tau}[1 + R_{i,t}] - \prod_{t=1}^{\tau}[1 + E(R_{i,t})]$$

which represents the return of the sample firm less the expected return, derived using one of the benchmarking methods presented in the preceding section. Calculating the average CAR and BHAR of a sample leads to the generalized findings of the event study.

To test for statistical significance, both methods rely on the use of t-statistics to test the null hypothesis. The null hypothesis in this case is that the cumulative abnormal returns, or the buy-and-hold abnormal returns, for the sample firms are equal to zero during the sample period. The parametric t-statistic is calculated by dividing the sample mean ($\overline{CAR_{i,t}}$, $\overline{BHAR_{i,t}}$) by the sample standard deviation ($\sigma_{CAR_{i,t}}$, $\sigma_{BHAR_{i,t}}$) multiplied by the square root of n.

$$t_{CAR} = \frac{\overline{CAR_{i,t}}}{\sigma_{CAR_{i,t}}} \; x \; \sqrt{n}$$

$$t_{BHAR} = \frac{\overline{BHAR_{i,t}}}{\sigma_{BHAR_{i,t}}} \; x \; \sqrt{n}$$

The choice of which method to use when estimating long-term abnormal returns is a subject that has been heavily debated in the literature. In general, most researchers caution against the use of long-term event studies, due to the difficulty in obtaining well-specified test statistics which are heavily dependent upon the model employed (Fama, 1998; Barber & Lyon, 1997; Kothari & Warner, 1997). Both Fama (1998) and Mitchel & Stafford (2000) argue heavily for the use of the CAR method, showing that the BHAR method is riddled with poor statistical properties and often times produces biased results. Kothari & Warner (1997) and Barber & Lyon (1997) both show that BHAR results tend to be positively skewed to the right, leading to unreliability in the normal t-test. This may in turn lead to an over-rejection of null hypotheses, what is known as a Type I error (Rosen, 2006). However, many researches have chosen to use the BHAR method over the CAR method, despite its lack of statistical reliability (Ritter, 1991; Barber & Lyon 1997). The BHAR method seems to be a better simulation of actual long-run investor experience (Ritter, 1991; Barber, Lyon, & Tsai, 1999). Furthermore, the BHAR method has better power over the CAR method when it comes to hypothesis testing (Rosen, 2006).

The wealth of criticism that has been levied against these two main methods has led to numerous attempts to establish new methods that correct for the statistical biases and inconsistencies. Examples of such models include the calendar time approach (Fama, 1998; Barber, Lyon, & Tsai, 1999; Mitchell & Stafford, 2000), the GARCH approach (Bollerslev,

1986), and bootstrapping (Fama, 1998; Barber & Lyon, 1997). While each method aims to improve one or more aspects of the statistical difficulties, they each come with their own challenges and constraints. Because CAR and BHAR are still consistently used in event studies to this day, it can be reasonably assumed that that despite their theoretical and statistical challenges, researchers are still comfortable employing the models to draw meaningful conclusions, adding caution where necessary.

4.4. Choice of Method and Motivation

Given the above-mentioned benefits and drawbacks of the potential methods to be used in an event study, this analysis will employ both the buy-and-hold abnormal returns method and the cumulative abnormal returns method to assess whether mergers and acquisitions create value for shareholders in the airline industry. Given the CAR and BHAR's widespread use in the academic literature regarding shareholder value after mergers and acquisitions, it appears both are appropriate choices and will give differing perspectives to the research question, which can serve as a robustness check.

Three different event window lengths will be used in this study. The first event window will begin one day before the announcement of the deal and extend until one day after said announcement. This event window, typically written [-1 , 1] is the most commonly used event window in event studies (McNeil & Moore, 2005; Hanson & Song, 2000; Allen & McConnell, 1998). Furthermore, to account for the possibility of earlier information leakages and put less stress on the efficient market hypothesis, the second event window will range from three days prior to announcement to three days post-announcement [-3, 3]. Finally, the last event window will again start three days prior to the announcement of the deal, but will extend to 60 days after post-announcement. This will allow the study to capture the initial reaction of the stock price, as well as the development as more information becomes available. The decision to extend the event window past a few days post-announcement is driven by the antitrust and consumer protection laws that surround the airline industry. Just because the intent of a deal is made public, does not necessarily mean the deal will be approved by all necessary stakeholders and regulatory boards. These approvals can often take months to be completed, if they are approved at all. However, because of the volatility and cyclical nature of the industry, a time horizon of two months post-acquisition was chosen rather than a typical six month, or multi-year horizon used in long-term event studies. This is because as the horizon gets longer, it is

less likely that movements in the stock price can be attributed to the merger announcement, especially in such a volatile industry that is prone to shocks.

To determine a benchmark for normal returns, the market model will be employed using a reference portfolio, a technique suggested in the literature (Barber & Lyon, 1997). The choice to use a reference portfolio rather than a control firm is driven by the availability of airline tracking portfolios as well as the lack of available control firms within the airline industry. Due to the deregulation and rampant consolidation, it is very hard to find a firm that has not gone through a merger or acquisition event throughout the sample period. Today, there exist prominent airline tracking indices, namely the NYSE Arca Airline Index (XAL) for the airlines in the American market, and the MSCI European Airline Index for airlines in Europe. The use of these indices as reference portfolios is recommended by previous studies conducted on the airline industry (Manuela & Rhoades, 2014). However, these indices were not created until 1991 and 1995 respectively, meaning data is not available for some of the earlier post-deregulation mergers and acquisitions. Therefore, the Thomson Reuters DataStream World Airline portfolio (World-DS Airlines) will be used as the baseline reference portfolio in this study. As a secondary and tertiary step, the study will employ regional DataStream portfolios (US-DS Airlines and Europe-DS Airlines) and the above-mentioned prominent airline indexes (XAL and MSCI European Airline) when they become available, as a robustness test and to test whether such a step yields greater statistical significance.

The length of the estimation window will be 120 days, guided by the recommendations of MacKinlay (1997). The beta of the acquiring firm will be used to estimate normal performance. In the event of a "true merger", where the acquiring firm cannot be substantially identified and the merged companies' trade under a newly created unified ticker post-merger, a weighted average approach was adopted to assess normal performance in the estimation window. For instance, prior to their merger in 2008, Delta Air Lines and Northwest Airlines had nearly identical market capitalizations, indicating the merger was a true merger of equals. In order to estimate the normal return within the event window, the returns of each airline's stock will be weighted according to their market capitalization and combined to generate the weighted return within the estimation period. The following mergers will be treated in this way (relative market capitalization percentage included): Delta/Northwest (51% / 49%), USAir/American (44% / 56%), and United/Continental (44% / 56%)

The choice of methodology allows for the proper collection of sufficient data points and the performance of an empirically sound analysis and interpretation. Furthermore, it is justified by the above-mentioned studies that show that simple models, such as the market

model, produce results that are not substantially different from more sophisticated statistical models (Brown & Warner, 1985; Campbell, Lo, & MacKinlay, 1997). Brown & Warner (1980) also note that "a simple methodology based on the market model is both well specified and relatively powerful under a wide variety of conditions".

In order to test for statistical significance in H_2, which states that European mergers add less value than American mergers do, a second step regression will be performed in which the calculated CAR and BHAR results will be regressed on a dummy variable for the geographical region. The dummy variable (MARKET) will take the form of 1 if the merger took place within the European market, and 0 if in the American market. The estimation equation for the second step OLS regression is as follows:

$$CAR\ (BHAR) = \ \alpha + \ \beta_1\ x\ MARKET + \ \varepsilon$$

where α represents the coefficient, or value within the base case or American scenario, β_1 represents the incremental value affect above the base case caused by the merger being in the European region, and ε represents the error term. The results of the regression will give an indication of the impact the geographic region has on the CAR and BHAR after a merger. If β_1 is negative, and the results of a one-sided t-test indicate statistical significance, then H_2 will fail to be rejected. Although the second step regression is simple, and most-likely contains an omitted variable bias, the sign and magnitude of the beta should be indicative of the underlying economic relationship between geographic region and abnormal returns after a merger.

4.5. Data Collection and Summary

In order to compile a sample of merger and acquisition activity in the U.S. and European airline markets, a search was performed using the Thomson Reuters Eikon Mergers & Acquisitions database, which has information regarding over 1 million deals. The following search criteria were used:

Category	Rule
Deal Status	= Complete
Target Industry	= Transportation & Infrastructure
Target TRBC Industry Sector	= Airlines
Target Nation	= United States or European Countries
Acquirer Nation	= United States or European Countries
Form of the Transaction	= Merger or Acquisition or Acquisition of Majority of Assets
Acquirer Public Status	= Public or Subsidiary
Announcement Date	>1978 for American Carriers; >1989 for European Carriers

Figure 4: Deal Search Criteria

Limiting the study to focus on acquiring firms restricted the list to only purchasing firms that were publicly traded at the time of the deal, however, the public status of the target was unrestricted. In the event of a true merger, both companies had to be publicly listed. The choice of date span was set to capture only deals that occurred after the deregulation events of each respective market. The decision to use a two month post-announcement event horizon limits the analysis to exclude any deals announced after October 1, 2018. Using the above search criteria narrowed the search down to 151 potentially eligible deals. The data was then further refined by manually checking each deal to ensure relevance to the airline industry and ensure the public status of the acquiring firm. Finally, the remaining deals were checked to ensure stock price data was attainable for the periods in question. Doing so resulted in a final list of 64 deals, which consisted of 26 European mergers and 38 American mergers.

Stock price data was then collected for the 64 deals in the sample. A mixture of Bloomberg, FactSet, and Thomson Reuters DataStream was used where appropriate to compile the stock data. Price data was also collected for the reference portfolios and stock indices for the entire sample period, from 1978 to 2018. The data was then compiled into a tracking document and structured in such a way as to be used with the Stata regression software.

Due to the rapid consolidation that persisted in the industry following the deregulation activities, there were a few overlapping data points in the collected sample. An overlapping data point is one in which a firm acquired or merged with another firm and then engaged in another transaction within two months of the announcement of the original transaction. This is the case with four airlines in the sample. To deal with this, the identified overlapping transactions will be dropped from the longer event study. For example, two of the overlapping deals occurred approximately 50 days from the original transaction. This means they will be included in the three-day post event study but not in the 60-day post study. All overlapping events will be included in the one-day and three-day event studies. In the case of a transaction

occurring in the estimation window of a particular event, the estimation window will be shifted to be before the first transaction.

Figure 5 below details a summary of the included deals. Please see Appendix 1 for a full presentation of the 64 sample deals.

Sample of Mergers & Acquisitions in American and European Industries
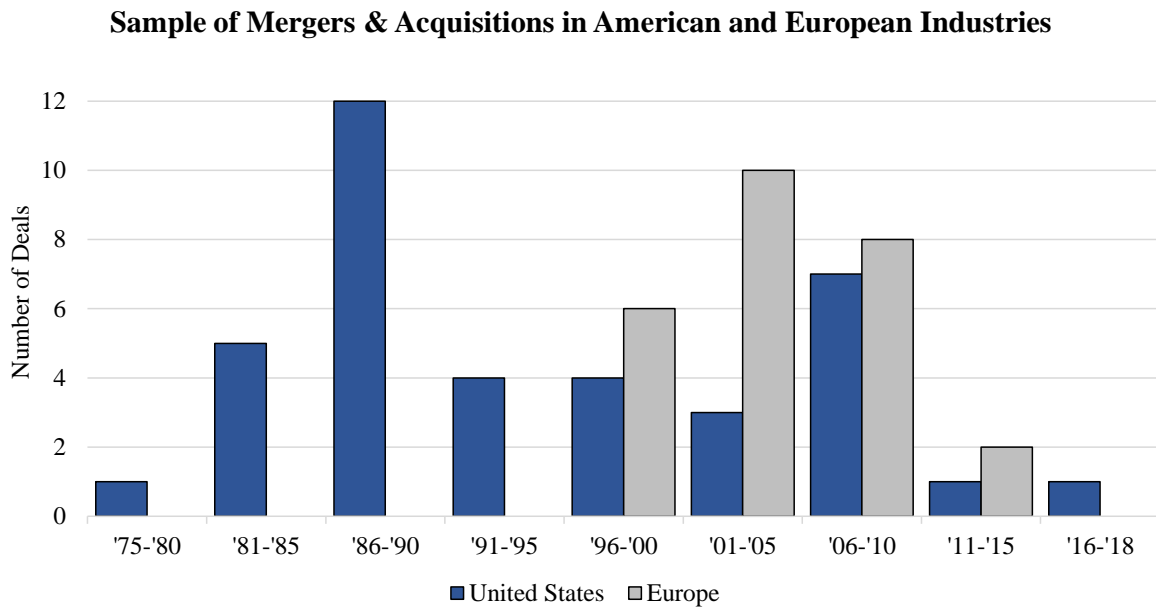
Figure 5: Sample M&A Deals

4.6. Empirical Design and Process

To begin the study, an excel file was created for each of the 64 mergers in the sample. This file included a unique identifier for each merger (Company_ID), the date of the announcement of the deal (Event_Date), daily stock price returns for both the acquirer's stock and the World-DS Airline reference portfolio (Actual_Return and Market_Return), and a dummy variable to identify United States or European airlines (MARKET). The files were then compiled and loaded into the Stata statistical analysis software.

The Princeton Review guide (2007) for event studies using Stata was consulted as a reference throughout this study. The first step was to identify the estimation window and event window for each deal in the sample. The first event study utilized an estimation window of 120 days prior to announcement to one day prior to announcement [-120 , -1]. For the longer event window studies, an estimation window of [-120 , -3] was used. The estimation windows were

defined using calendar days, not trading days, meaning the number of data points within the estimation window varies for each deal, with an average around 83 data points to be used for estimation.

With the estimation windows identified, a simple OLS regression was run using the market model presented in section 4 above, in order to determine firm specific alphas and betas based on the acquiring firm's stock performance relative to the reference portfolio performance over the estimation window. At this point, a Breusch-Pagan test and White test for heteroskedasticity was performed on the regression results to test for the presence of a skewed distribution in the model. The tests confirmed the statistically significant presence of heteroskedasticity in the OLS regression model. To account for this, the regression was rerun using robust standard errors.

It should also be noted that given the simplistic nature of the market model, there is the possibility of an omitted variable bias, leading to endogeneity problems. Endogeneity exists when there is a correlation between the independent variables and the error term. Examples of possible omitted variables in the market model for predicting airline stock returns include firm specific quarterly earnings releases, weather events, labor strikes, etc. Endogeneity may also be present in the model due to simultaneity, which is when the dependent and independent variables are correlated (Merton, 1968). The most common type of adjustment for this reverse causality is the use of instrument variables, which are notoriously hard to implement. Following the guidance by Brown & Warner (1985) and Campbell et al (1997), who find that the market model often times produces results that are not substantially different from more sophisticated statistical models, this study accepts the possible presence of endogeneity biases and makes no further statistical adjustments.

Using the regression results of the market model with robust standard errors, normal returns were predicted for the event window of each deal in the sample. This step was performed for the three different event windows: [-1 , 1], [-3 , 3], and [-3 , 60]. Once again, the length of the event window was based on calendar days, as opposed to trading days. As mentioned above, the longest event window has four less deals in the sample, due to overlapping events.

With the normal returns predicted, the abnormal returns were calculated by subtracting normal returns from actual returns observed during the event window. For each deal in the sample, cumulative abnormal returns and buy-and-hold abnormal returns were then calculated. Finally, the CAR and BHAR were averaged and the t-statistics of each were calculated. The results of the baseline event studies are presented in the following section.

5. Results and Discussion

5.1. Empirical Results

Method	Region	Event Window		
		[-1 , 1]	**[-3 , 3]**	**[-3 , 60]**
CAR	Consolidated	2.4%** (1.1%)	2.1% (1.4%)	2.5% (3.8%)
CAR	United States	2.9% (1.8%)	2.5% (2.2%)	3.9% (6.1%)
CAR	Europe	1.6% (0.9%)	1.6% (1.2%)	0.6% (3.2%)
BHAR	Consolidated	2.4%** (1.2%)	2.2% (1.4%)	1.6% (3.9%)
BHAR	United States	2.9% (1.9%)	2.6% (2.3%)	3.3% (6.4%)
BHAR	Europe	1.6% (1.0%)	1.5% (1.3%)	-0.9% (3.3%)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 6: Event Study Results (World-DS Reference Portfolio)

The baseline regression results use the DataStream World Airline portfolio (World-DS) as a reference portfolio to benchmark the abnormal returns observed. As can be seen in Figure 6, the results of the [-1 , 1] event window study indicate positive abnormal returns for airline mergers in both regions and on a consolidated group level, using both the CAR and BHAR method. Using the CAR method, the results are significant at the 5% confidence level for the consolidated group, and at the 11% confidence level for both European and American airline mergers. The BHAR produces similarly statistical significance, with the only difference being the results of the American mergers being significant only at the 13% confidence level. On a consolidated level, the results indicate that airline stocks generated on average 2.4% of abnormal returns to the shareholders of the acquiring firm after a merger's announcement. The highest abnormal returns are observed for the American airline mergers, with both methods indicating outperformance with an average abnormal return of 2.9%. European airline mergers, on the other hand, delivered a slightly lower average of 1.6% abnormal returns. As expected in such a short event window, there is no material difference between the results of the CAR and BHAR methods, as the compounding effects of the BHAR are immaterial in only a three day period.

Using a slightly longer event window of [-3 , 3] the results between the CAR and BHAR methods start to diverge slightly. The overall sign and magnitude of the results are maintained, with positive abnormal returns for all groups, and American airline mergers outperforming European ones. The overall abnormal returns observed are slightly lower than in the [-1 , 1] study. According to this event study, American airline mergers deliver on average 2.5% using the CAR method, and 2.6% using BHAR method. European airline mergers continue to lag the American mergers, with abnormal returns of 1.6% using CAR and 1.5% using BHAR. The consolidated group delivers slightly lower abnormal returns as a result, with an average of 2.1% using CAR and 2.2% using BHAR. However, using this longer event window, the statistical significance is lower, and all groups fail to meet the 10% confidence level. The consolidated group results would be significant at the 15% confidence level using both methods.

The final and longest event window of [-3 , 60] largely confirms the results of the previous two shorter event studies, with a notable exception. The consolidated group continues to deliver positive abnormal returns, with an average of 2.5% using CAR and 1.6% using BHAR. American airline mergers still deliver the highest abnormal returns, with an average of 3.9% using CAR and 3.3% using BHAR. Furthermore, the European airline mergers continue to perform the worst, with an average abnormal return of 0.6% using CAR, but a negative abnormal return using BHAR of -0.9%. This negative result means that acquiring airlines performed worse than the predicted normal return, indicating a destruction of value. This result constitutes a clear deviation from the previous two event windows. However, the statistical significance of the results in the [-3 , 60] event widow is substantially lower than in the two previous event windows. No group, using either method, shows any significance at even the 15% confidence level.

In order to test for significance of the geographic regional variable, a second step simple OLS regression was performed for each event window, regressing CAR (BHAR) against the MARKET dummy variable. The results of the regression are as follows:

Method	Variable	Event Window		
		[-1 , 1]	[-3 , 3]	[-3 , 60]
CAR	Coefficient (α)	2.9%	2.5%	3.9%
		(1.5%)	(1.8%)	(5.0%)
	MARKET* (β₁)	-1.4%	-1.0%	-3.3%
		(2.3%)	(2.9%)	(7.8%)
BHAR	Coefficient (α)	2.9%	2.6%	3.3%
		(1.5%)	(1.9%)	(5.2%)
	MARKET* (β₁)	-1.4%	-1.0%	-4.2%
		(2.4%)	(2.9%)	(8.1%)

*MARKET = dummy variable. MARKET=1 if M&A in Europe Region

Standard errors in parentheses

**** p<0.01, ** p<0.05, * p<0.1*

Figure 7: Second Stage Regression, CAR (BHAR) on MARKET Dummy Variable

As can be seen in Figure 7, the regression shows that on average European mergers exhibit approximately 1.0 – 1.5 percentage points lower abnormal returns than American mergers in the short-term event studies, with a much larger gap in the longer-term event study. However, a one-sided t-test for statistical significance showed that these results fail to be statistically significant even at the 20% confidence level, which limits the conclusions that can be drawn.

5.2. Robustness Check – Reference Portfolio Changes

The underlying benchmark index used to predict the normal returns with which the abnormal returns will be compared against is of crucial importance in an event study. As shown by Barber & Lyon (1997), the use of reference portfolio can have a huge impact on the results of the analysis. In order to check the robustness of the results, the entire analysis was rerun using regional airline stock portfolios and indices, benchmarking each airline against its corresponding regional airline portfolio, one for European airlines and one for American airlines. The goal of this robustness check is to confirm the original results, with the hopes of finding increased statistical significance.

5.2.1. Use of Regional DataStream Portfolios

Using Thompson Reuters DataStream, the US-DS Airlines portfolio and the Europe-DS Airline portfolio were used for the American and European airline mergers respectively.

These portfolios contain, as their name reveals, a compilation of the largest American and European publicly traded airlines. The justification for performing this modified event study is that a regional airline portfolio may be a better predictor of airline stock market returns in that region due to regional economic and political differences. The results of these adjusted event studies are presented in Figure 8 below.

Method	Region	Event Window		
		[-1 , 1]	[-3 , 3]	[-3 , 60]
CAR	Consolidated	2.2%* (1.2%)	2.3%* (1.4%)	1.7% (3.7%)
CAR	United States	2.8% (1.9%)	2.6% (2.3%)	2.0% (6.1%)
CAR	Europe	1.4% (0.9%)	1.9%* (1.1%)	1.2% (2.9%)
BHAR	Consolidated	2.2%* (1.2%)	2.4%* (1.4%)	0.9% (4.0%)
BHAR	United States	2.8% (2.0%)	2.7% (2.3%)	1.5% (6.6%)
BHAR	Europe	1.4% (0.9%)	1.9%* (1.1%)	0.1% (3.1%)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 8: Event Study Results (US-DS and Europe-DS Portfolios, respectively)

The results in Figure 8 are not materially different from those using the World-DS portfolio, with airline mergers still creating positive abnormal return to shareholders and American mergers outperforming the European mergers. The statistical significance, however, is generally not improved from the previous analysis using the World-DS portfolio. In the [-1 , 1] event window, none of the results are significant at the 5% confidence level. In fact, each group of airlines mergers are less significant than the previous analysis using both the CAR and BHAR method in the [-1 , 1] event window. In the [-3 , 3] event window, the significance is slightly improved across all subsets, with the consolidated group and European mergers being significant at the 10% confidence level using both the CAR and BHAR methods. Also, the American results are slightly more significant, albeit still not significant at even the 20% confidence level. Furthermore, the [-3 , 60] event window results are still highly insignificant. To conclude, the results show a drop in significance in the [-1 , 1] event window but a slight increase in significance in the [-3 , 3] event window, with the [-3 , 60] event window remaining

highly insignificant. Furthermore, while the results of the second step regression of CAR and BHAR on the MARKET dummy exhibited the same economical relationship as before, they failed to show an increase in statistical significance using the reference portfolio approach.

5.2.2. Use of Regional Stock Exchange Indices

Using the justification presented in section 4, the analysis was repeated using the NYSE Arca Airline Index (XAL) and the MSCI Europe Airline Index as reference portfolios. The XAL provides data from 1991 and is a true airline stock index covering the U.S. airline market. The European equivalent is the MSCI Europe Airline Index which provides airline index data from the European market since 1995. The main difference between the XAL and MSCI indices on one hand, and the US-DS and European-DS on the other, lies in the fact that the aforementioned are true indices with constantly rebalancing components. The DataStream portfolios more resemble stock portfolios in their nature and consists of the current composition of U.S. and European airlines and how they have performed historically. Therefore, they have the same components for the entirety of the period covered. This portfolio approach introduces a survivorship bias in the reference portfolio, as airlines who went bankrupt or for other reasons are not still trading are not represented in the portfolio. However, since neither the XAL nor MSCI indices contain data that stretch all the way back to 1978 and 1989 respectively, they are complemented with the US-DS Airline portfolio and Europe-DS Airline portfolio to achieve a reference portfolio with complete data that maintains a regional benchmark effect. The results of the XAL/MSCI analysis is presented in Figure 9.

Method	Region	Event Window		
		[-1 , 1]	[-3 , 3]	[-3 , 60]
CAR	Consolidated	1.9% (1.2%)	2.1% (1.3%)	1.1% (3.6%)
CAR	United States	2.3% (1.9%)	2.4% (2.2%)	1.6% (5.9%)
CAR	Europe	1.4%* (0.8%)	1.5% (1.0%)	0.5% (2.9%)
BHAR	Consolidated	1.9% (1.2%)	2.1% (1.4%)	0.4% (3.9%)
BHAR	United States	2.3% (2.0%)	2.5% (2.2%)	1.0% (6.4%)
BHAR	Europe	1.4%* (0.8%)	1.5% (1.0%)	-0.5% (3.0%)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 9: Event Study Results (XAL and MSCI Europe Airline, respectively)

Once again, the results in Figure 9 confirm the previous analysis with positive overall abnormal returns for airline mergers and American outperformance. The significance in the [-1 , 1] event window is generally lower than the baseline results and fail to reach the 10% confidence level in the consolidated group using both the CAR and BHAR methods. A slight improvement in significance is again noted in the European results, reaching the 10% confidence level using both CAR and BHAR. However, the second step regression again shows that there is a significant lack of statistical relevance when looking at the geographic differences. In the [-3 , 3] event window, there are only small changes in significance noted in the European results, where again, the significance is improved but fail to achieve the 10% confidence level. The [-3 , 60] event window is still highly insignificant, consistent with the previous analyses.

To summarize the robustness check, while the regional portfolio analysis confirmed the economic results of the original baseline analysis, it did not increase the overall statistical significance. However, there was a slight increase in statistical significance in the European results. This would imply that the U.S. firms have a large impact on the World Airline portfolio. Another way of viewing it would be that European regional indices are better predictors of European market returns. However, given the mixed results and lack of clear improvement in significance, there is not a convincing justification for changing the baseline results to the regional index approach.

5.3. Discussion of Results

Despite the challenges in statistical significance, the results show a clear pattern of economic significance through all event windows. The results show that airline mergers have indeed on average delivered positive abnormal returns to shareholders for American and European airlines in the years following deregulation. The results have the most statistical significance when assessing value using the traditional short event-window of [-1 , 1], but lose statistical relevance as the event window is lengthened. This is in line with expectations and intuition, given that, in absent of information leakage and rumors, the shorter event window should capture more of the stock price effect of the announced merger and less of the "noise" of the underlying market and other factors affecting the stock price. This is also consistent with McWilliams and Siegel (1997) who caution that longer event windows yield less statistical significance and can lead to confounding effects. Regardless, the sign and magnitude of the results are consistent throughout all three event windows, at around 2.0% - 2.5%. Furthermore, the statistical significance in the shortest event window allows the conclusion to be made that M&A deals add value in the studied industries, thereby failing to reject H_1.

In addition to this finding, the results show that while American airline mergers, on average, delivered around 2.9% abnormal returns, the European airline mergers delivered significantly less, albeit still positive, abnormal returns of around 1.6%. The results are in line with H_2, although the statistical significance of the results limits the conclusions to be drawn. In addition to the reasons mentioned above, the lack of statistical significance could be influenced by the low sample size. The sample only included 38 American deals and 26 European deals, which inhibits the ability to obtain statistical relevance, since sample size is part of the t-test calculation. Regardless, the fact that all the results indicate the same general relationship, with American airlines outperforming their European counterparts in M&A value creation, is a promising sign that H_2 may hold true. However, due to the lack of statistical significance, H_2 cannot be definitively supported.

6. Conclusion

6.1. Summary of Findings

This thesis employed an abnormal returns event study methodology to perform an empirical analysis on the value creation of M&As within the American and European airline industries. Utilizing popular methods such as the OLS market model, CAR, and BHAR, and employing varying event windows of [-1 , 1], [-3 , 3], and [-3 , 60], the results indicate that airline M&As deliver positive abnormal returns to shareholders of the acquiring firm in these respective markets. The baseline regression showed a sample-wide return of 2.4%, which was statistically significant at the 5% confidence level using both the CAR and BHAR methods and an event window of [-1 , 1]. Therefore, this study fails to reject the first hypotheses that airline M&As do increase shareholder value for these markets. These results lead to the conclusion that in a post-deregulation environment, airline M&As have created value and been beneficial to the shareholders of acquiring airlines in the American and European markets.

To test the second hypotheses that American airline M&As create more shareholder value than European M&As, a second stage regression was performed, regressing the CAR and BHAR returns on a regional dummy variable. The results of the second stage regression indicated that American airline M&As do appear to create more value than European M&As, with an outperformance of roughly 1.4 percentage points in the [-1 , 1] event window study. Although these results were consistent throughout all event windows and robustness checks, they consistently lacked statistical significance, thus limiting the conclusions that can be drawn. The lack of statistical significance in the results mean this study cannot reject the null hypothesis that there is no difference in M&A value creation stemming from the geographic regions. Therefore, this study finds no convincing support for the second hypothesis that airline M&A deals performed in the European market create less shareholder value than deals in the American market.

These findings have clear implications for current and future investors in the airline industry. The overall positive returns following M&A deals indicate that consolidation, on average, is beneficial within this industry. Therefore, investors should not be off-put by the high levels of M&A activity within the industry. Rather, as the number of competitors shrinks, beneficial components such as reduced excess capacity and increased competitor behavior should make the industry more attractive to potential investors. However, investors in European airlines should exercise caution. Though consolidation in this geographic region

appears to still be beneficial, there are additional regulatory and cross-border hurdles that limit deal potential, relative to their American counterparts. However, in the event of further liberalization in the European region, the American results of this study show a promising sign of what could be in store for the European market.

This study also contributes to the broad base of existing literature surrounding value creation of M&As. While studies many studies show that M&As tend to add little to no value to acquiring firms in a broad context (Cogman, 2014; Hackbarth & Morellec, 2008; Moeller et al, 2005; Rehm & Siversten, 2010; Walker, 2000), this study shows that when value effects are studied on an industry by industry basis, this generalization may not hold true. Instead, these results are more in line with the proposal by Koeller et al (2015), who notes that some types of M&A's, such as ones that reduce excess capacity or put a firm in the hands of better owners, can actually be quite successful. The results also contribute to the literature comparing value effects in different geographic regions, loosely supporting the results of Schosser & Wittmer (2015) and Umber et al (2014), who find that cross-border effects are inhibitors of deal maximization. This would suggest that M&As should become more and more valuable in a world of future deregulation and cross-border liberalization.

6.2. Restrictions and Limitations

The main restriction in this study is the small sample size of public deals within the two markets in the years studied. With only 38 American deals and 26 European deals, it is hard to draw definitive conclusions that can be generalized to the markets as a whole. To one extent, the focus on public acquiring airlines naturally restricted the study, leaving no room for arbitrary expansion of the data sample. However, some airline mergers were removed from the sample simply due to a lack of readily available stock market data. The inclusion of this missing data could have extended the sample size to a level at which statistical significance could have been realized and stronger conclusion drawn, particularly in the regional studies.

One further restriction of the study stems from the lack of proper and readily available airline reference indices before 1992. Given that a good reference index is a crucial part of a market model event study, this could have an impact on the results. This is further complicated by the inability to implement a control firm approach, due to the turbulent history of the deregulated airline industries.

Finally, the statistical methods used in this study are simple in nature, guided by the studies of Brown & Warner (1985) and Campbell et al (1997) who argue that simple market model results do not substantially deviate from the results of more sophisticated statistical models. However, it cannot be denied that an extension of the analysis with additional methods such as the GARCH-method or bootstrapping could have reduced biases and improved the reliability of the results.

6.3. Future Research

This analysis could be extended further by attempting to explain the reasons behind value creation in airline M&A activity. Future research could for example test the correlation between abnormal returns and measures of excess capacity, regulatory complexity, cross-border/domestic acquisition, deal size, friendly/unfriendly acquisition, time to completion, and other factors that could affect value creation in airline M&As. With the described approach, future research could incorporate these and other variables in an endeavor to gain in-depth insight into what makes an airline M&A create value. Of course, the study could also be extended to include global airline M&As, not just American and European, to test the generalizability and universality of the findings. Another area of expansion would be to compare the M&A activity pre- and post-deregulation, which could bring further insight into the effects of deregulation on airline consolidation. In conclusion, this study contributes to the literature by presenting intriguing findings regarding M&A activity in the two most mature airline markets, but a wealth of future research regarding the topic and the industry are encouraged and welcomed.

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Appendices

Appendix 1: Sample Deals (64 Deals - 38 American, 26 European)

Deal #	Deal ID	Region	Announcement Date	Merger Date	Acquirer	Target
1	PANAM_NATIONAL	United States	8/23/1978	12/31/1978	Pan Am Corp	National Airlines Inc
2	MIDWAY_AIRFLORIDA	United States	8/21/1984	8/27/1985	Midway Airlines Inc	Air Florida Inc
3	AIRMIDWEST_SKYWAYS	United States	9/25/1984	1/18/1985	Air Midwest	Scheduled Skyways Inc
4	SOUTHWEST_MUSE	United States	3/8/1985	12/12/1985	Southwest Airlines Co	Muse Air Corp
5	AIRWISC_MVA	United States	5/21/1985	5/21/1985	Air Wisconsin Inc	Mississippi Valley Airlines Inc
6	PIEDMONT_EMPIRE	United States	9/25/1985	2/4/1986	Piedmont Aviation Inc	Empire Airlines Inc
7	NWA_REPUBLIC	United States	1/23/1986	8/12/1986	NWA Inc	Republic Airlines
8	TWA_OZARK	United States	2/27/1986	9/15/1986	Trans World Airlines Inc	Ozark Holding Inc
9	ALASKA_JETAMERICA	United States	8/6/1986	12/30/1986	Alaska Air Group Inc	Jet America Airlines
10	DELTA_WESTERN	United States	9/9/1986	12/19/1986	Delta Air Lines Inc	Western Airlines Inc
11	AMERICAN_ACI	United States	11/17/1986	4/30/1987	American Airlines Inc	ACI Holdings Inc
12	ALASKA_HORIZON[1]	United States	11/19/1986	6/29/1987	Alaska Air Group Inc	Horizon Air Industries Inc
13	USAIR_PACIFICSW	United States	12/8/1986	5/29/1987	US Air Group Inc	Pacific Southwest Airlines(PS Group Inc)
14	USAIR_PIEDMONT[1]	United States	2/17/1987	11/5/1987	US Air Group Inc	Piedmont Aviation Inc
15	BRANIFF_FLORIDAEXP	United States	10/28/1987	12/31/1987	Braniff Inc	Florida Express Inc(IMM Inc)
16	AMERICAN_WINGSWEST[2]	United States	4/18/1988	8/10/1988	AMR Corp[2]	Wings West Airlines Inc
17	AMERICAN_COMMAND[1,2]	United States	6/13/1988	9/28/1988	AMR Eagle-East Inc(AMR Corp)	Command Airways Inc
18	AMERICAN_SIMMONS[1]	United States	6/20/1988	8/8/1988	AMR Eagle-Central Inc(AMR Corp)	Simmons Airlines Inc
19	MESA_AIRMIDWEST	United States	1/24/1991	7/12/1991	Mesa Airlines Inc	Air Midwest
20	UNITED_AIRWISC	United States	9/17/1991	1/24/1992	UAL Corp	Air Wis Services Inc
21	MESA_WESTAIR	United States	11/7/1991	6/1/1992	Mesa Airlines Inc	WestAir Holding Inc
22	USAIR_TRUMP	United States	12/18/1991	12/30/1997	US Airways Group Inc	Trump Shuttle Inc(Trump Organaization)
23	PANAM_CARNIVAL	United States	3/20/1997	9/26/1997	Pan American World Airways Inc(Pan Am Corp)	Carnival Airlines Inc(Air Holding Co)
24	VALUJET_AIRWAYS	United States	7/10/1997	11/18/1997	ValuJet Inc	Airways Corp
25	BRAATHENS_MALMO	Europe	8/17/1998	8/17/1998	Braathens ASA	Malmo Aviation(Wiklund Inter Trade)
26	MESA_CCAIR	United States	8/28/1998	6/10/1999	Mesa Air Group Inc	CCAIR Inc

#	Name	Region			Acquirer	Target
27	DELTA_COMAIR	United States	10/18/1999	1/11/2000	Delta Air Lines Inc	Comair Holdings Inc
28	AIRFRANCE_DUBREUIL[2]	Europe	1/19/2000	3/8/2000	Groupe Air France SA	Regional Airlines SA(Dubreuil SA)
29	PREUSSAG_BRITANNIA	Europe	1/31/2000	1/31/2000	Preussag AG	Britannia Airways Ltd
30	AIRFRANCE_CITYJET[1]	Europe	2/1/2000	2/1/2000	Groupe Air France SA	Cityjet Ltd(Air Foyle Ireland Ltd/Air Foyle Holding Co Ltd)
31	AIRFRANCE_BRITAIR	Europe	6/19/2000	6/20/2000	Groupe Air France SA	Brit Air SA
32	AUSTIRAN_LAUDA	Europe	8/18/2000	2/1/2001	Austrian Airlines Osterreichische Luftverkehrs AG	Lauda Air Luftfahrt AG
33	BRITISHAIR_BRITISHREG	Europe	3/8/2001	5/16/2001	British Airways PLC	British Regional Airlines Group PLC
34	SAS_BRAATHENS	Europe	5/21/2001	12/17/2001	SAS AB	Braathens ASA
35	SAS_SPANAIR	Europe	11/2/2001	3/5/2002	SAS Group	Spanair
36	EASYJET_GOFLY	Europe	5/16/2002	8/1/2002	easyJet PLC	Go Fly Ltd
37	MESABA_BIGSKY	United States	9/27/2002	12/4/2002	Mesaba Holdings Inc	Big Sky Transportation Co
38	RYANAIR_BUZZ	Europe	1/31/2003	4/10/2003	Ryanair Holdings PLC	buzz
39	LUFT_DOLOMITI	Europe	3/6/2003	3/6/2003	Deutsche Lufthansa AG	Air Dolomiti SpA
40	LIVINGSTON_LAUDA	Europe	3/13/2003	3/13/2003	Livingston Aviation Group SpA	Lauda Air SpA
41	AIRFRANCE_KLM	Europe	9/30/2003	5/21/2004	Groupe Air France SA	Koninklijke Luchtvaart Maatschappij NV{KLM}
42	ALITALIA_GANDALF	Europe	3/25/2004	3/25/2004	ALITALIA Linee Aeree Italiane SpA	Gandalf SPA
43	LUFT_SWISSAIR	Europe	3/22/2005	7/1/2007	AirTrust AG	Swiss International Air Lines AG
44	AWA_USAIR	United States	5/19/2005	9/27/2005	America West Holdings Corp	US Airways Group Inc
45	SKYWEST_ASA	United States	8/15/2005	9/8/2005	SkyWest Inc	Atlantic Southeast Airlines Inc
46	AIRBERLIN_LUFTFAHRT	Europe	8/17/2006	9/30/2006	Air Berlin PLC & Co Luftverkehrs KG	Deutsche BA Luftfahrt GmbH
47	AIRPARTNER_GOLDAIR	Europe	10/11/2006	10/11/2006	Air Partner PLC	Gold Air International Ltd
48	AIRBERLIN_LTU	Europe	3/26/2007	8/31/2007	Air Berlin PLC & Co Luftverkehrs KG	LTU Lufttransport-Unternehmen GmbH
49	EASYJET_GBAIRWAYS	Europe	10/25/2007	1/31/2008	easyJet PLC	GB Airways Ltd
50	DELTA_NORTHWEST	United States	4/14/2008	10/29/2008	Delta Air Lines Inc	Northwest Airlines Corp
51	LUFT_BMI	Europe	4/25/2008	7/1/2009	Deutsche Lufthansa AG	British Midland PLC
52	LUFT_AUSTRIAN	Europe	12/3/2008	10/23/2009	Deutsche Lufthansa AG	Austrian Airlines AG
53	BRITISHAIR_VUELING	Europe	1/9/2009	8/8/2013	Veloz Holdco SLU	Vueling Airlines SA
54	REPUBLIC_MIDWEST[2]	United States	6/23/2009	7/30/2009	Republic Airways Holdings Inc	Midwest Airlines Inc
55	REPUBLIC_FRONTIER[1]	United States	8/13/2009	10/1/2009	Republic Airways Holdings Inc	Frontier Airlines Holdings Inc
56	MESA_MOKULELE	United States	10/22/2009	12/31/2009	Mesa Air Group Inc	Mokulele Flight Service Inc
57	BRITISHAIR_IBERIA	Europe	11/12/2009	1/21/2011	BA Holdco SA	Iberia Lineas Aereas de Espana SA
58	UNITED_CONTINENTAL	United States	5/3/2010	10/1/2010	UAL Corp	Continental Airlines Inc
59	SKYWEST_EXPRESSJET	United States	8/4/2010	11/15/2010	Express Delaware Merger Co	ExpressJet Holdings Inc
60	SOUTHWEST_AIRTRAN	United States	9/27/2010	5/2/2011	Southwest Airlines Co	AirTran Holdings Inc
61	AMERICAN_USAIR	United States	8/31/2012	12/9/2013	AMR Corp	US Airways Group Inc
62	AEGEAN_OLYMPIC	Europe	10/22/2012	10/22/2013	Aegean Airlines SA	Olympic Airlines SA

| 63 | IAG_AERLINGUS | Europe | 12/18/2014 | 9/1/2015 | AERL Holding Ltd | Aer Lingus Group PLC |
| 64 | ALASKA_VIRGIN | United States | 4/4/2016 | 12/14/2016 | Alaska Air Group Inc | Virgin America Inc |

[1]Estimation Window Error
[2]Event Window Error, excluded from 60-day post event study