

# **Master's Thesis**

MSc in Finance and Investments

# Mergers and acquisitions in the U.S. airline industry

An event study of stock data observations from the last three decades

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# ABSTRACT

After the Deregulation Act of 1978 changed the U.S. airline industry from being government controlled to a liberalized market, a merger wave struck the industry where consolidation among a great proportion of airlines created the legacy carriers of today. Three decades later, the industry have seen a new wave, only this time with a completely different underlying motivation. From previously consolidating in order to grow geographically and improve operational performance, the new millennium have seen U.S. airlines merge in order to survive as bankruptcies and financial distress have challenged the existence of the majority of U.S. airlines.

Where there exists evidence of collusive pricing as a result of the mergers in the postderegulation time period, there are not any recent research including mergers of the 21<sup>st</sup> century. With a foundation based on previous studies, this thesis aims to answer two hypotheses. The first hypothesis asks whether there are positive abnormal returns for bidder and target airlines involved in an airline merger at the time of announcement. The second hypothesis looks at the existence of collusion among rivals through the market power hypothesis, which suggests that rivals benefit from competitors' mergers as collaboration limits output and increase prices.

The hypotheses are tested through an event study where all available stock data from U.S. airlines between 1985 and 2016 is included, thus only including data from a liberalized industry. Through measuring the normal performance of the stocks, abnormal returns are calculated and analyzed. The data have been divided into smaller samples to better explain the economic performance of the merging airlines and their rivals through the three-decade horizon, and in addition looked at collectively to yield an overall conclusion.

From the available data, there are evidence of both bidder and target airlines achieving positive abnormal returns upon an M&A announcement, in line with previous research. While the data initially indicates the existence of market power through collusive pricing, the inclusion of new data makes this study decline the market power hypothesis for the dataset as a whole, indicating that rivals experience slight disadvantages from their competitors' mergers rather than benefits.

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# 1 INTRODUCTION

When US Airways and American Airlines merged into the American Airlines Group in 2013, they formed the 'new American Airlines', which became one of the largest airlines in the world measured in both fleet size and annual passenger numbers. The merger was named *The last great American airline merger* by The Economist (2013), after the industry had seen the number of major carries in the US market shrink massively due to a high number of consolidations between airlines. "Mergers and Acquisitions (M&As) are among the most important corporate events in the finance and business world in terms of both size and impact" (Bell et.al., 2013, p. 287). This quotation certainly applies for the airline industry, as mergers in many cases have been seen as the last possible option, trying to stay profitable in a hostile and low-margin environment. Therefore, it would be interesting to investigate the economic impact of airline mergers and acquisitions in to explain which benefits airlines may receive from such a transaction.

In the diverse M&A literature, the economic effect of the announcement of a merger or an acquisition is broadly agreed upon. According to Jensen & Ruback (1983), the target firm or the company being bought in the M&A transaction, is expected to generate significant positive abnormal returns of 20 percent or more in the days omitting the announcement of the transaction. On the other hand, the acquiring firm or the bidder, is not expected to achieve any significant gains, but rather to receive insignificant slightly negative or positive abnormal returns. Most of the research in this area is performed on large datasets without any specific industry in focus when analyzing the abnormal stock returns on firms in M&A transactions. However, on the research provided on the airline industry, only small data samples have been available, as the number of applicable airline mergers and acquisitions in the history of time is not particularly large.

Some of the most important research on the economic effect of airline mergers and acquisitions were made in the decades following the Deregulation Act of the United States of 1978. Their approach was often targeted at analyzing market power as a motivation for performing M&As, using abnormal stock returns in the period around the announcement to test for any significant effects. Knapp (1990) was the pioneer in examining the post-

deregulation data, and found that both the target and the bidding airline were expected to achieve positive abnormal returns from the announcement, even though the target firms were expected higher gains. Another technique to be used is analyzing fare prices, which generally has reached the same conclusions regarding positive returns and motivation of increased market power (Singal, 1993). As of today, the newest study of relevance in the field is Singal (1996), which like Knapp (1990), covers the U.S. airline industry with and a time period of transactions in the late 1980's. Additionally, he combines stock returns and airfares in his analysis of the economic impact of a merger. While more M&A transactions have taken place since that time in both the U.S. and worldwide, only the American market will be the subject in this study in order to make the research comparable, and the fact that the vast majority of recent mergers have happened in the U.S. market. Furthermore, there should be enough new data to test the economic impact of airline M&A announcements beyond what is already studied, mainly by enhancing the landscape of transactions from a time period of merely four years to more than three decades.

Besides looking solely at the pure economic impact of M&A announcements in the form of abnormal stock returns, analyzing the performance of rivals on the days of the announcements may determine whether the mergers are subject to any synergies. In the literature, Knapp (1990) have found evidence supporting what is known as the market power hypothesis, implying that a merger in the airline industry creates positive abnormal returns for the rivaling firms as a result of increased price collusion due to illegal collaboration. Using mostly the same dataset as Knapp, Singal (1996) supports the findings of positive abnormal returns among rivals upon merger announcements and thus support of the market power hypothesis through his combination of stock return and airfare analysis. With the same reasoning as in the previous paragraph, the window of mergers used in existing literature is narrow. By adding more airlines, from other time periods, it will therefore be of interest to analyze whether rival airlines still are expected to achieve positive abnormal returns upon the merger announcements of their competitors.

## 1.1 MOTIVATION

The airline industry is widely known as one of the most competitive in the world. Largely due to a high number of bankruptcies, low profit margins and fierce global competition,

succeeding in the industry traditionally has been the exception rather than the norm. With a high personal interest in airplanes and the magic of flying, the airline industry is one I follow closely every day. To gain a better understanding of why some airlines survive in the industry and others do not, I want to analyze historic mergers and acquisitions in the airline industry and their effects on the airlines' stock prices. By doing this, I hope to find if there are any statistically significant gain or loss on the stock value expected from a merger. Additionally, I want to understand whether the mergers and acquisitions are made purely to save low-performing airlines, or if it is also the case for already successful airlines to achieve other goals, such as access to new markets, better operational performance or fleet expansion. Finally, as a frequent flyer I aspire to investigate in which ways airline mergers affect me as a customer. Does a merger imply collusive and thus higher pricing, or will it only be beneficial to me as the airlines like to present the case? This study will reveal how mergers impact the industry, and thus give both the reader and me an insight in what this does mean from a financial and personal perspective.

### 1.2 PROBLEM STATEMENT

When two airlines merge, the two separate companies are commonly referred to as the bidding or acquiring firm and the target firm. While a merger might have numerous exogenous and endogenous motivational factors, they should also be fulfilled in a way that benefit the shareholders of both the acquiring and target firm (Bell et. al., 2013). With an intuitive approach, this would apply to both airlines in the merger, giving a common goal in creating added value for both companies. In academic literature, there are a general consensus that the target company achieve added value from the merger in the short term, proposed by Jensen & Ruback (1983) among others. However, the value added for the bidding or acquiring firm is more disputed, and where Andrade et. al. (2003) shoved that the abnormal returns on the same horizon for the target firm were stable at above 20 percent, the abnormal returns on the same horizon for the acquiring significant positive abnormal returns for the target firm, while the acquiring firm is left with negative and insignificant abnormal returns (Campa et. al. 2004) in the short run.

The United States currently holds one of the most consolidated airline markets in the world, where a few large players control the majority of the traffic on domestic routes in addition to being of substantial size in the international market. With the academic literature implying zero or even negative abnormal stock return for the acquiring firm, this would make all the major U.S. airlines have no stock gain rather than added value from the latest mergers where airlines like United, Delta and American have been on the bidding side. Market observations from the U.S. airline industry by the Department of Transportation (2014) indicate that consolidation among carriers have led to better on-time performance, lower flight cancellations and improved ground handling. It is therefore of interest to analyze whether the abnormal returns are different in the airline industry than implied by existing general research on M&As, or whether there are other motivational factors behind airline mergers than solely the operational benefits presented by the Department of Transportation.

This thesis will address the abnormal stock returns of both the bidder and target firms from the relevant days omitting the merger announcement, in addition to a select number of rival stock returns from the same dates. The aim is to explain whether airline mergers create wealth in the form of increased stock returns, and if this is a mere result of increased operational excellency or as a result of strengthened price collusion in the market. Therefore, with the parameters set for the study, an appropriate research question is:

"Do airline M&A announcements generate positive abnormal returns for bidders and targets, and can the economic impact on their rivals return explain exercise of market power?"

# 1.3 STRUCTURE

The purpose of presenting the structure of the study is to give the reader a better overview of how the thesis will substantiate its tests and conclusions in academic literature, industry information and an overall discussion regarding the topic.

Chapter 2 will put the study in an academic context in regards of previous research and relevant economic theories. There will be a literature review of the most relevant articles on the topic, and a brief look at the theoretical framework to anchor the underlying financial factors the empirical study in this thesis are relying upon. Some insights in what defines a

M&A transaction will also be presented, conveying their high degree of importance in the history of finance.

In chapter 3 there will be a short introduction to the U.S. airline industry. Understanding this is key to build a fundament for conclusions about airline mergers and acquisitions and enable the empirical testing to explain behavior in the U.S. aviation industry. This section will also include a terse review of the 2013 US Airways/American Airlines merger, to explain specific motivations and outcomes of an airline merger. The information will lead up to the two main hypotheses to be tested in this thesis.

The statistical framework will be presented in chapter 4. The model of choice will be described, using a combination of Campbell et. al. (1997) and Skovmand (2013), as a basis for the mathematics on how to perform an event study. Terms such as abnormal returns and normal performance will be extensively explained in this section, alongside the horizon of the study and choice of event windows in which the stock performance will be analyzed.

Chapter 5 takes a deeper look into the data selection, discussing why some airlines are included and others are not. There will also be presented a number of limitations regarding the collected data, giving the reader insight in the selection process and thus better understanding of the forthcoming results.

The full data analysis will take place in chapter 6, looking at the airlines included in the mergers in addition to their rivals, which again will be split into smaller samples. This will give both the author and reader the possibility of explaining and interpreting the results based on evidence from earlier studies as well as knowledge of the industry of today. The data will also be looked at jointly, in order to reach conclusions on a general basis and not solely based on data from smaller data samples.

#### **Figure 1: Structure of the thesis**



These six chapters will make the study reach its discussion, omitting an overall conclusion from the two main hypotheses. Additionally, there will be an examination of weaknesses in the study and lessons learned in relation to these. Ending the discussion is a brief look at future expectations, which will majorly be based on the results and assumptions reached and observed in the study.

### 1.4 ACADEMIC RELEVANCE

M&As play a major role in the industry of today, with decreasing average airfares forcing competitors to consolidate in order to survive in the market. And survival is the key word in this context. In any business, the main goal for a company is maximizing the shareholders' wealth. Hence, the goal for managers performing a M&A should be an outcome that would benefit the people holding stakes in both the merging companies. However, Cartwright & Cooper (1992) argues that 50 percent of M&As should be classified as failures, while Christensen et. al. (2011) are implying a failure rate in-between 70 and 90 percent. The questions to be asked are then why companies continue to merge together or acquire other companies despite the fact that multiple studies show that the effects are negative or non-existing, or if the airline industry is different from the rest?

Deciding whether a merger is successful or not is easier said than done. The studies mentioned in the preceding paragraph are solely research based on interviews with managers and their respective companies in a given time period post-merger. While this may be valuable in terms of understanding whether internal operations have improved, this study will focus on the stock performance of the airlines, which should reflect both the performance of the airlines in addition to signs of collusive pricing. Therefore, instead of being a strategic paper of the managerial side of a merger, it is a descriptive study following the research and methodology of Knapp (1990) and Singal (1996), using publicly traded information to determine whether mergers are successful or not.

However, it is still of interest and necessity to understand what kind of underlying dynamics that are driving the urge to merge among airlines. There have been published quite a few studies on key success factors in M&As. One study puts the successful types of mergers or acquisitions into five archetypes based on the rationale behind the decision, being improving performance, to remove excess capacity from the industry, accelerate market access, acquire technological skills or pick winners for developing (Goedhart et.al., 2010). If the core motivation for a M&A is not one of these, a successful end product in the shape of a well-functioning merger firm is even harder to reach. Another study points out that there have to be a sufficient understanding of pre- and post-acquisition variables such as due diligence and paying the right price before the merger, and the speed and strategies of the implementation as well as the leadership of the new firm after the merger (Gomes et. al., 2013). In short, there is reason to believe understanding the dynamics of why a merger takes place can better enable the ability to describe and interpret the economic impact through an event analysis.

The motivational factors will be discussed in relation to the statistical analyses that will be performed, in order to find any significant effect that M&As have on the stock prices in the airline industry. Combined, the aim is to create a picture describing for the reader why airlines succeed in a M&A or not, and why they end up doing it in the first place.

# 2 THEORY

In any research paper, whether it is in a completely new area of investigation or a continuation of already existing knowledge, the exploration is based on a set of underlying theories and relevant literature. This thesis is no different, as it covers a topic previously researched by including new available data. It is therefore reliant on discussing and taking the research methodology and conclusions from the existing papers into consideration. In addition to the interpretation of previous research, the research of this thesis has to coincide with a theoretical framework, which in this study is the efficient market hypothesis. As the study uses publicly traded information in the form of stock prices, the theoretical framework gives an indication of how the information given by the stocks should be interpreted.

Jointly, the existing theory related to available literature on mergers and acquisitions both in general and the airline industry, in addition to the efficient market hypothesis, create the foundation that this study is building on in order to reach conclusions and a relevant discussion omitting the subject.

## 2.1 LITERATURE REVIEW

The aim of a literature review is to relate the topic of a study to existing literature. This has the possibility of benefiting the study in multiple ways, as it includes a thorough research of content underlying or describing the topic. According to a number of universities, a literature review will help the author determine what is already known about the topic, identify experts in a particular field of study, identify some key questions that need to be answered and determine research methodology used in similar, previous studies (Taylor, 2016). This literature review will be split into four parts. First, a brief overview of some definitions and key characteristics of mergers and acquisitions. Second, there will be presented existing research on stock performance in general from merger and acquisition announcements. Third, there will be a more in depth review of the airline industry mergers and acquisitions, and different research models used to determine short-term performance. Finally, the literature on market power and efficiency gains will be presented to better explain why it is being investigated in this thesis.

### 2.1.1 DEFINITIONS OF M&As

While a merger and an acquisition may seem like they are the same, as they often are spoken of interchangeably under the general term M&As, there is a slight difference between the two. "Mergers are defined as two firms merging into one single entity and acquisitions are defined as a company acquiring a relatively important percentage (an arbitrary 14%) of ownership in the target firms" (Gong & Firth, 2006, p. 92). Another definition proposes a merger as "the combination two or more companies in which only one firm survives as a legal entity" (Van Horne & John, 2008, p. 604). Where mergers usually are a transaction based on agreements and negotiations between the firms, an acquisition can be both friendly or hostile (Roberts et. al. 2013).

In both a merger and an acquisition there are two counterparties, usually described as the bidder and the target. The bidder, or the acquirer, would be the dominant firm in the transaction, while the target would be the lesser firm. In a pure acquisition, this is easily distinguished as one firm buys the other. However, this may be less obvious in a merger as it not necessarily needs to be one bidder and target. In addition to the acquisition, there are five commonly referred to types of mergers (Department of commerce, 2017). The conglomerate merger is between two firms with unrelated business activities. A horizontal merger is the most relevant in this study, as it commonly represented as an intra-industry merger. Market extension mergers may also apply to the airline industry, as it is between two companies who offer the same products, but in separate markets, like a low cost carrier and a legacy carrier. The product extension merger allows to firms with business related to each other to group together and reach a larger group of customers. Finally, a vertical merger happens when two firms at different levels of an industry merges to generate synergies by expanding its value chain.

### 2.1.2 M&A EFFECT ON STOCK PERFORMANCE

Measuring the effect of a merger or an acquisition can be performed by using two different approaches related to time horizon, in either a short-term or long-term perspective. While the measuring of short term effects mainly is based on stock performance in the time period around the announcement of the proposed merger, the long-term effects are more complicated to measure. Loughran & Vijh (1997) analyzed the long-term shareholder benefit by computing post-acquisition returns over a five-year period. While their results may be significant, there is a possibility that there exist events over this horizon, such as new mergers or the launch of a new product line, that can bias the results. Additionally, studies by Agrawal et. al. (1992) and Mitchell & Mulherin (1996) have tried to explain why the long-term effect tend to be negative, but without conclusive evidence. On the other hand, the long-term effects can also be measured through a more strategic perspective, using a survey of acquiring firms' managers, and analyze their results by incorporating cost efficiency and resource-based theories (Capron, 1999). However, due to the complexity and potential bias of long-term performance, the main focus will be on short-term and announcement related stock performance.

The general consensus in academic literature is that the target firm experience positive gains on the short run, while the effects for the acquiring firm usually are not significant. Jensen & Ruback (1983) analyzed 13 studies of corporate takeovers and provided evidence that takeovers generate positive gains in total. They concluded that the shareholders of the target firm are the ones who benefit, while the bidding firm shareholder neither win nor lose. This view is supported in a more recent study, analyzing more than 1000 takeovers in the United states between 1985 and 2002 of publicly traded firms (Hackbarth & Morellec, 2008).

Another view proposed on the short-term effect of M&As was proposed by Eckbo (1983) who looked at the effect on collusion among rivals as an effect of a horizontal merger. His hypothesis is that horizontal mergers would generate positive abnormal returns for shareholders of both the bidding and target firm, as a result of increased collusion in the market. Additionally, if rivals were to cooperate after an industry merger, they would also be expected to benefit as output become limited and prices increase. While Eckbo observes a tendency that both bidder and target firms perform better in challenged than in unchallenged mergers, he finds no significant evidence that a post-merger collusion among rivals makes either the firms involved in the merger or their rivals gain value. However, he does find evidence that firms have motivation to perform horizontal mergers in order to achieve efficiency gains.

Early research was mainly revolved around takeovers, and studies have previously implied that the abnormal return of a tender-offer is higher for the target firm than in a merger. Huang & Walking (1987) tested abnormal returns for target firms in relation to the type of offer, in addition to payment form and degree of resistance. They find results that these factors play an important part in explaining each other. When looked at jointly, the hypothesis of different abnormal returns in tender-offers and mergers become insignificant. However, evidence implies that cash offers have significantly higher abnormal returns, while high degree of resistance only generate insignificant, but higher abnormal returns for the target firms.

Finally, more recent research suggests that size matters in M&A transactions, especially related to the bidder (Moeller et. al., 2004). Based on a study of more than 12,000 firms, they observe an around two percent higher abnormal announcement return for small acquiring firms. In fact, they find the financing factor of the transaction or whether the firm is public or private to be irrelevant. However, it is worth mentioning that despite implying a higher abnormal return for small bidder companies, and a positive equally weighted abnormal announcement return, they claim that the shareholders of the acquiring firm in general are expected to lose upon announcement.

### 2.1.3 M&As IN THE AIRLINE INDUSTRY

The majority of the research available on abnormal returns upon announcement to both bidder and target firms involves studies based on hundreds or even thousands of companies involved in M&A transactions. In the airline industry however, the selection of relevant transactions is sparse, and most of the literature is limited to small samples of airlines, mainly from the U.S. industry. However, this has not stopped researchers historically to test the short-term effects of airline mergers or acquisitions, by applying both the methodology of testing for abnormal stock returns and analyses of airfare changes to determine the short-term performance.

One of the early studies looking solely at the airline industry using an event analysis had a mere nine merger transactions in its sample. Knapp (1990) tested whether firms would merge to gain market power, using the methodology of computing abnormal returns. Interestingly, he finds significant positive abnormal returns for both acquirers and target firms in the short

run. Also, he observes significant positive abnormal returns for rivaling airlines. These data lead to the conclusion that airlines would merge to gain market power, and not only for efficiency benefits as concluded in previous research. Additionally, he finds the spillover effects for rival airlines to be significant after airline consolidation. This study is the first to only use M&A transactions from a liberated market. Previous studies, using data from before 1985, do to some extent suffer from antitrust bias, as their stock returns represent a government controlled industry where routes and airfares were not controlled by the airlines themselves.

The government controlled situation in the U.S. airline industry before liberalization in 1978 made Jordan (1970) propose a theory that the controlling entity at the time, the Civil Aeronautics Board (CAB) worked in favor of a collusive industry by limiting competition and maintaining high entry barriers for U.S. airlines. Slovin et. al. (1991) therefore published a study testing whether consolidations among airlines generate monopoly effects, splitting the dataset at the year 1978, into pre- and post-deregulation data. The methodology tested excess returns rather than abnormal returns, as the objective was focused on finding the possibility of an existing systematic industry effect. The study observed significant higher excess returns in the mergers from the regulated period than in the deregulated market, and thus supporting the hypothesis proposed by Jordan (1970) that a cartel market situation supporting the collusion of airlines existed in the U.S. under the CAB prior to the deregulation of the industry.

Returning to the hypothesis of airlines achieving market power as a result of consolidation, stock changes upon the merger announcement are only one way of measuring effects. Han Kim & Singal (1993) published research which used price changes of airfares in the U.S. to determine the performance of industry mergers. The main outline of the study was that average airfares on the routes of the merged airlines increased relative to a control group unaffected by the merger, and that these were not a result of either increased efficiency of operations or to adjust to an imperfection of supply and demand. It is rather an effect of increased market power, proved by changes in concentration and a positive relation between airfares and distance flown. In addition, the study concludes with positive spillovers for rivals, through parallel pricing between the merging firms and its competitors on important city-pairs.

Continuing the process to determine whether market power is a significant effect of airline mergers, Singal (1996) combines his previous studies on airfares presented above alongside stock data from the same set of mergers. In this research, abnormal announcement returns are computed for both bidding and target airlines, and analyzed separately as well as in conjunction with the observations provided from the analysis of airfares. The findings in the paper is that target firms generate significantly high, positive abnormal returns, while bidding firms generate vaguer positive abnormal returns, which are significant in most cases. For rivals, the are mainly positive and, with the majority of values being significant. However, by linking changes in the stock market to changes in the product market, Singal strengthens his tests substantially and concludes that airlines M&As do result in increased market power, as well as improved efficiency. This opposes the previous research on horizontal by Eckbo (1983) and Stillman (1983) which declines the market power hypothesis.

### 2.1.4 EFFICIENCY AND THE MARKET POWER HYPOTHESIS

While the gains or losses proposed by mergers and acquisitions have been studied widely for decades, the mechanics behind them remain with less successful research. In an attempt to determine the drivers behind why companies merge, Andrade et. al. (2001) gives an overview of several reasons. They bring up the one factor that is probably the most intuitive, that a merged and larger firm will achieve better operational performance through economies of scale as the main underlying factor. Furthermore, they also prompt what they define as other synergies, represented by market power in the form of creating a monopoly or oligopoly in the wake of the merger. Three additional reasons are mentioned as well, market discipline by removing incompetent management at the target firm, taking advantage of diversification and the attempt to over-expand by management of the acquiring firm. Without doubt, the two initial reasons are the ones most broadly discussed in academic literature, although with little empirical evidence in comparison to studies of the output of the mergers in which these motivational factors determine.

The general market power hypothesis has been described adequately by Devos et.al. (2009) as "If combining large firms in similar industries significantly decreases competition, firms could increase the prices they charge their customers for their products and/or decrease the prices they pay their suppliers for raw materials" (p. 1184). However, evidence of this

hypothesis as a motivational factor or source for a merger have been in the form of varied results, and in most cases more related to the industry than to the economy in general. From Singal (1993) there is evidence that airfares on routes operated by airlines merging increased significantly. This complies with the evidence found by Knapp (1990) and supports the fact that there have been signs of market power as a motivational factor in the airline industry. Another interesting study on this topic is found in the banking sector, where Sapienza (2002) finds that merged banks charge lower interest rates due to operational improvement, but let the interest rate charged in local markets of the merged entity to remain constant, implying an action of market power. Although, studies by Eckbo (1983) among others struggle to find evidence of collusive behavior and thus acceptance of the market power hypothesis as a motivational factor behind mergers.

The hypothesis also creates a question regarding intervening of governments in the case where the trade-off between economic benefits and market power as a result of a merger comes out with a higher degree of the latter. Mentioned at an early stage in the academic literature by Williamson (1968), he stressed whether antitrust agencies could rely on information given on the economic benefits resulted of a merger, when comparing to the implications of market power. In a more recent study by Gugler & Siebert (2007), it is described how the U.S. Department of Justice (DOJ) approves mergers based on what is described as a 'efficiency defense'. This defense is made by the merging parts of the transaction, with the goal to convince the authorities that operational improvements exceeds an eventual increase in market power effects, in which the total welfare is increased. However, with previous evidence of market power in the airline industry in the case of mergers and acquisitions, this study will try to determine whether market power truly is a result of M&A transactions, and thus also a motivational factor.

The process of transforming abnormal stock returns into explaining the presence of market power is mentioned by Knapp (1990) in the form of three different angles. By analyzing the stock returns of the rivals of the merging firms on the days of the relevant announcements, it may determine what kind of synergies the merger might produce. He suggests that if the rivals experience negative abnormal returns, either the newly merged firm has become a stronger competitor due to increased efficiency, it has increased market power which might force competitors out of business, or it has made the market concentration peak, making future mergers of antitrust issue. If the returns are positive this may imply higher degree of price collusion, while zero abnormal returns indicate that there are solely industry specific effects from the mergers, in the shape of tax savings or similar. This will be the main foundation in explaining the presence, or the lack of, market power among airlines in this study.

The existence of market power may in some cases best be explained through an analysis of airfares, as it is performed in Singal (1993). While stock prices can give indications in terms of negative or positive returns to rivals, the ticket costs of air travel can indicate the contestability of a market. As described in Borenstein (1989), there is evidence that the pricing of a specific route increase when the concentration increases. He describes how some airlines are able to maintain high prices in concentrated markets, without letting competitors sharing the benefits. This opposes the umbrella-effect, which implies that rival firms benefit from the market power of a competitor. He has also stated the importance of having a significant size of the market share between two city pairs, as this drives prices up and thus increases market power (Borenstein, 1990). While these findings might not be directly related to an event analysis of stock returns among merging airlines, it certainly helps in understanding the intuitive interpretation of how airline mergers may generate market power.

# 2.2 THEORETICAL FRAMEWORK

The theoretical framework is intended to explain how to interpret the data input in a study, in addition to extend the knowledge already existing in the published research. In this study, this framework comes in the shape of the economic theory underlying how the information from stock data should be interpreted and analyzed, and why interpretations may differ. While this thesis will perform an event study on airline stock returns to determine abnormal returns and the subject of market power, it is important to know what fundamentals the calculations needed are built on. In order to describe the economic impact of an event, multiple measures can be used, which have been mentioned in the literature review through testing both price and stock effects as explanatory variables. Therefore, it is of importance to understand why it is possible to use stock prices and their returns as a proxy to determine operational performance and eventual existence of market power.

### 2.2.1 THE EFFICIENT MARKET HYPOTHESIS

The quest of this study is to determine eventual abnormal stock returns caused by the event of a merger between two airlines. More specific, the specific event is the announcement of the merger, which is publicly traded information concerning the airlines in question. The efficient-market hypothesis (EMH), also known as the Random Walk Theory, is a theory implying that current stock prices reflect all available information, making it impossible to 'beat the market' over time. The statistician Eugene Fama (1965) is said to be the first to mention the term efficient markets, and wrote in a paper that in one such market, "on the average, competition will cause the full effects of new information on intrinsic values to be reflected 'instantaneously' in actual prices" (p. 39). This instantaneous effect is backed in a study by Patell & Wolfson (1984), where they have evidence of the market responding to events such as an earnings or dividend announcement in around five to fifteen minutes, and thus one should not be able to make a next-day profit on the event. This research implies that in theory, the effect of a M&A should be reflected immediately the same day on the stock value, rather than over time (Malkiel, 2011).

However, there is no common consensus that all available information is always reflected in the stock price. Where Harvard professor Jensen (1978) stated that "I believe there is no other proposition in economics which has more solid empirical evidence supporting it than the efficient-market hypothesis" (p. 1), famous investor Peter Lynch claimed efficient markets to be only a 'bunch of junk' (Terence, 1995). Undoubtedly, the EMH is one of the most debated propositions of our time, which despite empirical evidence have no general accepted consensus. Therefore, when we speak about efficient markets, it is necessary to distinguish by the three different forms of efficiency rather than one sole form.

Being the first known person to mention efficient markets, Fama developed the full theory of efficient markets in the 1970's. With the disagreements and discussions being the concept of whether stock prices reflect all available information or not, the academic literature have agreed upon three versions of the EMH, based on how the term 'all available information' should be defined. These are weak, semi-strong and strong form of efficiency.

The weak form of efficiency is based on the work made by Kendall (1953) who found that stock and commodity prices follow a random walk and cannot be explained by previous events, which implies a zero correlation between the price change at time t and t + 1. If

stock prices have semi-strong form of efficiency they reflect all publicly traded information. This have been tested by using a methodology of cumulated abnormal returns to prove semistrong efficiency (Fama et. al. 1969). Finally, the strong form of efficiency implies that all stock prices reflect all private information, making insider trading and abnormal returns from mutual funds impossible. However, there are evidence of insider trading being profitable with abnormal returns reaching more than 6 percent (Jeng et. al., 2003), while mutual funds do not generate abnormal returns (Blake et. al., 1999). Only the latter finding is consistent with strong form efficiency.

The approach of this study is anchored in the semi-strong form of efficiency, by using the methodology of computing cumulative abnormal returns in order to determine the performance of the historic mergers and acquisitions in the airline industry. The data collected will be centered around the announcement of the merger, implying that the available public information will be reflected in the stock price at this time. As we are not able to test for private available information, the study will not be aligned with the strong-form of efficiency. However, leading up to the announcement of a merger, private information may become public, potentially realizing abnormal returns in the days before the merger. Additionally, anticipation of a merger through speculation in the media or among investors may also impact to which degree there exists public information that possibly can affect the stock values of the firms involved. And if the efficient market hypothesis does hold, the market does know best (Shleifer, 2000).

# 3 M&As IN THE AIRLINE INDUSTRY

The airline industry of today is considered one of the most competitive in the world, where a constant price pressure forces efficiency to constantly improve. Despite a high number of bankruptcies as a consequence of low profit margins, capital intensive market entry and operations, passenger numbers keep increase and the annual growth normally exceeds GDP growth (IATA, 2016). By attaining some knowledge of the industry, this can help in forming the hypotheses in which the performance in which airline M&As will be tested.

Traditionally, airline groups were divided into four main business models: legacy (flag) carriers, low cost carriers (LLCs), regional carriers and freight carriers. Having seen significant changes over the last decades, the distinction between the lines have been blurred, and it is today more difficult to distinguish one from another. This study will only cover legacy carriers, regional carriers and a few low cost carriers as these types of airlines are the most frequently represented in M&A transactions. While there has been some merger activity among freight carriers, the number is low. Additionally, the freight business represents an industry with substantial differences from passenger air transportation, and is thus perceived to be irrelevant in this study in explaining abnormal returns and in particular the exercise of market power. The majority of M&As performed in the airline industry has traditionally been involving the U.S. legacy carriers, which has created some of the industry's largest and most influential airlines (Greenberg, 2013). In order to understand why these airlines have merged to stay competitive, it is important to have some basic industry knowledge as well as how regulations and liberalization have impacted the industry.

## 3.1 OVERVIEW OF THE U.S. AIRLINE INDUSTRY

In the current U.S. airline industry, one could argue that the traditional split between legacy and low cost carrier simply does not reflect the actual business environment. Instead of just two, three categories containing ultra-low cost carriers, value airlines (which represent the LCCs of the past) and traditional network (legacy) carriers represent the industry better. It makes the airlines which stand between being no-frills actors and multi-continental carriers being better represented as value airlines. This represent an appropriate name for this group of airlines as they have been the profit makers of the 21<sup>st</sup> century U.S. aviation market in contrary to the legacy carriers which had a rough start to the new millennia.

On a more general note, the industry is seeing improved balance sheets and profits among almost all players. To be able to hold up with competition, the network carriers have been cutting services for fees, and even included LCC-like airfares commonly named 'basic' fares. Lower unit costs as a result of the drop in oil price have improved profits, while an increase in labor and salary expenses have restricted the overall effect. While the ultra-low cost carriers of the U.S. have almost the half unit cost of the legacy carriers, they are still far off their counterparties like Ryanair and Norwegian operating out of Europe. Instead, with a weak increase in available seat miles offered in both domestic and international markets by all carriers, the phasing out of old and phasing in of new, more efficient aircraft combined with higher load factors have been the main revenue drivers. However, with the constant consolidations changing the market situation and declining unit revenue, the situation of the industry in the future remains uncertain.

### 3.1.1 THE EVENTS THAT CHANGED THE AIRLINE INDUSTRY

Probably standing as the most important event shaping the airline industry of today is the Airline Deregulation Act of 1978 in the United States. Until this year, the U.S. airlines had previously been regulated as a public utility, where the Civil Aeronautics Board (CAB) had decided where airlines could fly at and which airfares they could charge. The deregulation act reduced the influence of CAB gradually until it was finally dissolved on January 1<sup>st</sup>, 1985. From this time on airlines were free to open routes wherever they wanted and to set the airfares they found appropriate. This led to the foundation of low cost carriers and a number of new airlines commencing operations in the U.S., which within the next two decades was copied in the European airline market. From the research proposed by Slovin et. al. (1991), mergers before the deregulation in 1978 were purposely contrived to retain strong market collusion. Mergers after this point is proved to be motivated by the gain of market power and enhanced efficiency (Singal, 1996). The liberalization of the market initially saw a huge amount of airline consolidation in the 1980's, with especially the typical trunk airlines take the step from being focused out of one or a few parts of the U.S. to serve the whole country

as one airline. Unchallenged by authorities, a natural consequence of the merger wave was a decline in merger activity in the coming decade.

The deregulated market saw the fall of legacy carriers such as Pan Am, and newly formed competitors thrived in their absence. However, more than two decades after the Deregulation Act, the industry saw another major event changing how the rules were writes, also this time taking place on U.S. soil. The 9/11 attacks were a hard blow to airline profitability both in the U.S. and worldwide, and it would take the industry almost five years to reach the profits which had been recorded preceding the attacks. In the period between December 2002 and October 2005 alone, United, Delta, Northwest and US Airways filed for Chapter 11 bankruptcy reorganization (IATA, 2010). The time period following the attacks saw another wave of airline mergers, but this time with a different motivation than in the years following the deregulation of the market. Airlines were forced to think and act differently to reduce operating costs and retain passengers, and mergers ended up being the solutions for all legacy carriers in the U.S. we know today. It should therefore be of interest to analyze whether there have been any significant changes in the stock returns of airlines in the post-9/11 years compared to the time following the deregulation.

### 3.1.2 MODERN AIRLINE CONSOLIDATION

Where the most network carriers traditionally had merged with smaller regional airlines or competing trunk airlines to gain market power and stay competitive, the response of the late 1990's represented a different approach by the airlines. Instead of consolidate through mergers, collaboration between airlines around the world took place through the introduction of global airline alliances (Dennis, 2005). Collaboration and feeder routes had previously existed for more than a decade, but the formation of the new alliances meant more than just stand-alone agreements on select routes. Star Alliance was formed in 1997 around the likes of Lufthansa and United, while SkyTeam was constructed by main players Air France and Delta. A few years later, Oneworld was formed by American and British Airways, among others. The purpose of these alliances were to extend the reach of the individual airlines, by cooperating with national and international partners, optimizing the reach in pairing cities together beyond what was possible on an individual basis. Alongside joint scheduling and marketing, the alliance airlines could join together their frequent flyer programs, making

customers able to earn and redeem miles on partner airlines (Hanlon, 1999). Additionally, the local presence of flag carriers in Europe and legacy carriers in the U.S. made the large international airports like Newark and Atlanta into alliance hubs for United's Star Alliance and Delta's SkyTeam (Morrish & Hamilton, 2002).

Despite the consolidation through alliances, airline M&A activity saw as mentioned an increase in the early 2000's after multiple bankruptcies in the industry. Poorly performing airlines were taken over by competitors, not only in the United States, but also on a global scale. Most of the acquiring firms in this period belonged to one of the large airline alliances, and by acquiring another airline they grew stronger themselves in addition to make their respective alliance more powerful. This wave of mergers has been lasting until present time, seeing the major American carriers performing a final round of mergers, leading to a highly consolidated U.S. airline market consisting of a mere three legacy carriers. Even though the consolidation has been on a global stage, other markets like the European and the Asian airline markets have seen alliance-independent low cost carriers dominate the industry, putting further consolidation on hold compared to the United States.

# 3.2 MOTIVATION FOR AIRLINE M&As

In the same way as an accident seldom is caused by one single event, there are usually multiple reasons and motivations behind a proposed merger. However, there will in most cases be some fundamentals underlying the motivation to join forces and merge into one entity. In general, M&A transactions have proved to generate gains of the shareholder value, especially if looking at the target firms. "The intuitive reason underlying this value creation stems either from an ability to reduce costs of the combined entity, an ability to charge higher prices, or both" (Chatterjee, 1986, p. 119). The aim for any manager will be to make sure that synergies from the mergers will help the new company obtain added value, which by Chatterjee is split into financial, operational and collusive synergies. With most airlines M&As being horizontal mergers, it is interesting to see Walter & Barney (1990) confirming that in contrary to vertical or conglomerate mergers, there are no single goal that dominates the motivation of horizontal mergers. Rather, they observe the key motivations for horizontal mergers to be accessibility to new markets, economies of scale and expansion of product lines, which in the airline industry could be increasing yields with a new premium product.

#### 3.2.1 OPERATIONAL MOTIVATION

It is not possible to mention motivations for airline M&As without starting with bankruptcies. A significant amount of all mergers between airlines in modern history, which in this setting is post 1985, is mainly motivated by one well-performing airline taking over another airline with poor financial performance. In many cases, an airline on the brink of going under generally has two options: exit the market and cease operations, or merge with another airline to keep the jobs of the employees and the fleet flying. However, there are evidence of both major and minor airlines surviving a bankruptcy, and emerge back in the market. According to Moss & Mitchell (2012), bankruptcies have become something of 'business as usual', and explain the high probability of emerging from bankruptcy in the industry by factors as valuable assets, slots at congested airports and specialized and skilled personnel. On the other side, these factors will also be valuable for an acquirer looking to merge to potentially increase some kind of market power.

Research have showed that market power is an important motivating factor in airline mergers (Singal, 1996). When two airlines merge they have the potential to gain monopoly-like access to certain markets, both measured in routes and airport hubs. This may again lead the newly joint airline to increase fare prices on these routes, leaving the only competition to smaller regional carriers or LCCs without a sufficient network to compete against the larger merged airline. This may also affect some of the merging airline's local hubs. An examples of this are the route cut of 85 percent at Lambert–St. Louis after bankrupt TWA was taken over by American in 2001. To stay profitable and gain synergies cost related, retaining all pre-merger hubs for the new airline in likely to be less profitable. This also gives the merged airline the possibility to eliminate thin and unprofitable routes, and focusing more on higher-demand routes to increase the yield – revenue per available seat mile.

The degree of cost saving from a merger is highly questionable, and there are claims that mergers both improve and worsen the overall cost of the joint airline (Moss & Mitchell, 2012). It is often easy to see the benefits from joint maintenance, fewer and larger hubs, and general savings from economies of scale. However, on the flipside there are a number of factors that can make the synergy effects disappear. Some of these are related to integrating data systems, which have proved to be difficult in mergers of the past, resulting in delays and even litigation involving contested issues. Another factor is joining two loyalty programs into

one, and at which rate existing members account balances should be transferred into the new program. Though disputed, the most relevant literature is focused on operational benefits from increased size and larger hubs (Gillen et. al., 1990), while the effects related to integrating systems and similar factors are less discussed in academic literature.

There is a general belief in the world of economics that an increase in scale decrease the unit cost making operations more profitable. However, researchers have been disputing this topic for decades, with results differing significantly between industries. In a double industry study by Koshal (1972) he finds evidence that the Indian trucking industry enjoys economies of scale, at least up until a certain threshold of operational distance. Although, in the other part of the study he finds no evidence of scale economic benefits for U.S. bus transportation companies. In the post-regulation time period, Caves et. al. (1984) released a study indicating that airlines do not benefit from economies of scale, but rather economies of density. The main intuition behind this is that a large fleet does not improve operations, but control over important markets, and thus city-pairs which increase the bottom line. While this may have empirical evidence, it is based on data from a time where the CAB controlled the industry. For many years the large U.S. carriers have been operating a vast diversified fleet of aircraft, contributing to high maintenance and staff costs due to the need for various spare parts and knowledge among crew. In the years following the research of Caves et. al. (1984), especially low cost carriers have made significant benefits out of operating only one (or at maximum two) different types of aircraft, and thus generating benefits through fleet commonality as an example of economies of scale. It is therefore reason to believe that while airlines might have merged solely to gain control over important markets in the past, the influence of economies of scale might have forced competition to merge and streamline fleets in the later years.

### 3.2.2 STRATEGIC MOTIVATION

Before the U.S. airline market was deregulated, the Civil Aeronautics Board (CAB) controlled the pricing of routes on its own premises. In studies performed by both Jordan (1970) and Slovin et.al. (1991) it has been pointed out that the CAB maintained and almost incentivized airlines into a 'cartel-like' collusive industry. While the industry might be liberalized today, without any board setting prices or deciding where and when to fly for the

airlines, there still exists motivation for the carriers to work together illegally and then be able to charge more for their airfares.

In recent years, multiple airlines worldwide have received large penalties by the European Union based on allegations of collusive pricing on the carriers' respective cargo transport. However, no U.S. carrier has been involved in any of the penalties, which does not make them necessarily innocent. In 2015, the Department of Justice (DOJ) in the United States opened a probe in determining whether the four largest airlines in the country (American, Delta, United and Southwest) had colluded in their expansion plans. The case was dropped early 2017 due to lack of evidence, making the carriers go free of any financial punishment from the department. Although, both cases are a clear reminder of what might happen in a tight industry with low operating profits, where players might see illegal price collaboration as the last olive branch in order to survive. It is also worth noting that this collusive behavior might be hard to prove by evidence, as the merging of airlines might create natural hubs for the airlines in the market, making competition less on certain routes and thus enabling carriers to charge overprice without making explicit deals with a competitor (Powell, 2017).

#### 3.2.3 RESTRICTING ENFORCEMENT

Even if there are operational motivation for airlines to merge, the transaction does not necessarily have to happen just because management finds the merger beneficial to their own interests. As mentioned in the introduction, if the effects of collusion among players in the industry outweighs the pure operational benefits, the merger will not benefit the public but rather be a disadvantage. There are multiple records of proposed mergers not making it into the final transaction in the U.S. aviation history. For American carriers, it is the Department of Transportation (DOT) that approves if a proposed merger should go through or not. However, the Department of Justice (DOJ) can overrule the decision if they find the merger to e.g. increase market power if imminent failure. The rationale behind this is to make sure that mergers not will lead into some markets ending up being monopolies or duopolies, taking advantage of the customers.

In recent times, a proposed merger between US Airways and United in 2001 was stopped by the DOJ due to major concerns that customers would lose choice of airlines and potentially higher fares, where the merger would imply a monopoly or duopoly on more than 30 routes, and strengthened control on the east coast hubs of the merged airlines. This is the exception rather than the norm, and all other notable mergers have been approved by the DOJ in this century, although sometimes with an obligation for the merged airline to sell some routes to competitors or cut codeshare agreements. The question is therefore to what extent the routes of two merging airlines overlap insufficiently to be cleared by the DOJ in the U.S. on not creating monopoly tendencies in certain markets. Some research has showed that the DOJ will overlook overlap on routes if there are enough competition from e.g. LCCs in addition to give a significant weight in the merging airline's defense of synergies and efficiency improvements. (Moss & Mitchell, 2012).

## 3.3 THE CASE OF THE AMERICAN – US AIRWAYS MERGER

After four consecutive years of annual losses, American Airlines parent company at the time, the AMR Corporation, filed for bankruptcy. Cost saving and restructuring plans were made, mobilizing the carrier's high personnel expenses and phasing out old aircraft to reduce fuel expenses, which immediately lead to a positive bottom line. After the executives initially had denied talks of a potential merger, the positive effects of the restructuring made American a potential merge partner for US Airways. Negotiations led into a merge proposal from them to form the American Airlines Corporation, parent company of the largest airline in the world in, American Airlines.

#### 3.3.1 MAJOR ISSUES PRE-MERGER

Seeing both Delta and United having proposed mergers with Northwest and Continental respectively, and being approved by the DOJ, expectations were that also this merger would go through and create the last of the three mega-legacy carriers in the U.S. However, the DOJ challenged the merger for near-monopoly on routes in select markets and at some airports. For instance, the merged carrier would have to sell more than 100 take-off and landing slots at Reagan National Airport in Washington DC in addition to one third of the same rights at LaGuardia Airport in New York City. These settlements terms would allow competition from both LCCs and other legacy carriers at these airports and some of the routes, making the DOJ

satisfied with the merger proposal, and eventually clearing it on November 12<sup>th</sup>, 2013. While some believe the challenge from DOJ against the merger was only to retain their reputation, with the number of slots to be forcefully sold at low prices. On the other side, some pointed out that the sale of slots would reduce the cartel-like arrangements between legacy carriers and allow LCCs to enter new markets benefiting the customers (Bolte, 2014).

According to Moss & Mitchell (2012), there were seven major issues raised by the proposed merger. Some of the most important issues mentioned is firstly one related to control over both national and regional networks. While the two carriers pre-merger had bases all around the country, the joint airline would close some of the smaller hubs while strengthening the reminder of the most important hubs throughout almost every part of the country, giving little free space in order for competition to enter. Secondly, significant overlap could impact routes of near-monopoly, and thus increase prices in the same manner that had happened after both of the two legacy carrier mergers in the last seven years leading to 2013. Third, while the merger could hit smaller communities through downgrading aircraft and eventually focus on larger airports in the region, there was also a potential issue that the strengthening of the hubs would benefit the legacy carriers jointly, making it harder for LCCs to enter these markets, making competition suffer on both the regional and national network.

### 3.3.2 POST-MERGER EFFECTS

Based on evidence from previous airline mergers, expectations for the new American Airlines were divided. Initially, both Delta and United experienced difficulties in the first years after their mergers, especially related to the integration of data systems leading to delays harshening the on-time performance. However, in the time following the difficult post-merger years, both carriers turned losses to profits and have continued to record annual positive numbers on the bottom line (Maxon, 2013). Therefore, there was an anticipation that American Airlines would yield positive results following the merger, despite management knowing about potential problems in the early phase after completing the merger transaction. American Airlines' CEO which came from US Airways, Doug Parker, stressed that "as the largest airline in the world, we should also be the most profitable" (p. 502), while he acknowledged that they might struggle to find immediate success both on operations and the bottom line (Bolte, 2014).

Interestingly, the American Airlines stock increased by over 25 percent in the first seven weeks after the listing of the all new American Airlines Group Ltd. on NASDAQ in the fall of 2013. Additionally, the airline experienced an increase in the average dollar per mile spent by the customers of five percent. The airline has continued to generate profits in the years following the merger, with the stock also have seen a positive development. This has made American able to phase out a significant amount of older planes, making room for newer, more fuel-efficient aircraft. All things considered, it may seem like American has been able to avoid some of the pit-falls made by their competitors in previous mergers, capitalizing on their mistakes to generate profits right from the start.

# 3.4 HYPOTHESES AND AREAS OF FOCUS

From the previous three sub-chapters, there are clear motivational factors for airline M&As in order to stay competitive or to be rescued in the case of bankruptcy. In unification with the information from previous research, this makes it possible to form two main hypotheses to be tested in this thesis.

*Hypothesis 1*: There exist positive and significant abnormal returns for both acquiring and target airlines upon the announcement event of a merger.

The abnormal returns are expected to be positive for both target airlines following the knowledge from existing studies by Knapp (1990) and Singal (1996). Additionally, while the abnormal returns for bidder firms have been observed, they have not always been significant.

*Hypothesis 2*: There does not exist evidence from rival airlines' returns to accept the market power hypothesis.

From the relevant literature on the subject, the data have been inconclusive in whether the market power hypothesis can be accepted or not. The dataset should therefore be tested in order to determine how rivals are affected by industry mergers through the existence of either positive or negative abnormal returns. Additionally, in the literature regarding M&A transactions beyond the airline industry, rival firms are not expected to generate positive abnormal returns. These results have made the market power hypothesis generally being declined, and thus represents a natural starting point for the second hypothesis.

# 4 STATISTICAL FRAMEWORK

In the academic literature where abnormal stock returns in the event of a merger announcement are analyzed, there are used slightly different approaches in the testing techniques applied in each study. However, the main focal point remains the same, and in broad terms the statistical frameworks are similar as they are testing for positive or negative abnormal returns and whether those are statistically significant or not. As this exact study is revolved around the airline industry, the research from that specific industry seems to be the most appropriate in conducting relevant testing. Inspiration will therefore be taken from Knapp (1990) and Singal (1996) in particular, as the two have the most up-to-date and recognized research on the field. The two differ slightly in testing design, and with little information on the specifics of how they form their variables, the exact structure to be applied will be the event study as described in Campbell et. al. (1997).

## 4.1 RESEARCH DESIGN

In broad terms, there are two common types of research designs. Those are deductive and inductive studies, which differ in the foundations of conclusions and certainty. The inductive approach is often viewed as producing results of less certainty, where the conclusion is in the shape of a suggestion rather than a closed form solution to the research question. It does often involve open questions, which lead to further decisions in the research process being selected on premises of low probability (Hurley, 2014). On the other hand, the deductive research design is built on the foundation of creating certain conclusions, such as having statistical significance on test results. The logic in the deductive research process is also revolved around whether information is valid or not, and not related to their probability in the same way as the inductive design. The deductive design is the most used in finance, as research in the area is focused on generating solid results rather than merely probable conclusions (Bryman & Bell, 2011).

The purpose of this study is to determine if airline stock announcements generate abnormal returns for the merging firms, in addition to the economic impact on rivals to determine whether the mergers can be seen as an exercise of market power. The stock reaction to one

particular merger announcement may not happen at the exact day of the event, but could be found either before or after the announcement by observing the returns of both the merging and rival airlines, making it possible to examine the market reaction to the event (Hauswald, 2003). Aggregated, this makes the study able to determine whether there exist abnormal returns in conjunction with the unanticipated event of a merger announcement (McWilliams & Aiegel, 1997). Following the economic theory, according to the semi-strong form of market efficiency the effect of the announcement should be reflected immediately in the respective stock prices of the involved airlines (MacKinlay, 1997). Although, there are reasons to believe that an airline merger announcement might not be completely unexpected, and thus should this be reflected in the stock prices in the days leading up to the event itself.

The technique to be applied lies under the broad context of time series analyses, using discrete data of the time-domain to explain the economic effect of events at certain points in time. Therefore, an event study methodology will be applied as the aim is to analyze in what manner the available data responds to new market information in the shape of public announcement of airline mergers and acquisitions (Bechmann, 2016).

# 4.2 THE EVENT STUDY FRAMEWORK

The embodiment of the study will follow the same principles as used in Knapp (1990) and Singal (1996), to transform data returns from each airline into abnormal returns in the period omitting the announcement of the mergers. The methodology and framework to be used is the one presented by Campbell et. al. (1997), using their 'recipe' of how to perform a suitable event analysis of the available data of airline M&As, with supplements from Skovmand (2013). To enable precise calculations of a large dataset, the statistical tool R Studio will be applied to generate abnormal returns, as well as analyzing the significance of the results.

### 4.2.1 INTRODUCTION TO THE MODEL

In their book *The econometrics of financial markets*, Campbell et. al. (1997) provides an outline of an event study which will be followed more or less in the same order as in the book to not miss out on any critical procedures in performing an event study. First, the boundaries of the event itself should be defined. In this study, the event is already defined as the trading

day of the announcement of a merger between two airlines. In early studies however, the completion day of the merger was used as the event day, applied by Mandelker (1974) among others. Although, in more recent years and studies there has been a shift towards using the announcement of the merger as this often comes as new information rather than the completion of an already announced transaction. Therefore, it will be more relevant to analyze the announcement data in this study in order to explain abnormal returns for both target and bidding firms. In obtaining the correct announcement date for each merger, the publication of the merger announcement in *The Wall Street Journal* will be used as a proxy.

The timeline of the event study sets the boundaries for how data is collected and tested to analyze the effect of abnormal returns for stocks or other assets, and can be split into three parts. This is the estimation window, the event window and the post-event window. The two latter parts represent the analysis of short-term and long-term effects respectively. As already mentioned in the literature review, only the short-term results will be interpreted in this study, and the post-event window will thus remain irrelevant.





Source: Campbell et. al. (1997)

The date of the event, or merger announcement, is defined as  $\tau = 0$ . The estimation window is the time between time  $T_0$  and  $T_1$ , while the event window is illustrated as the time between  $T_1 + 1$  and  $T_2$ . A time period can be written on a general form as  $L_t$  which makes it possible to describe the estimation window as  $L_1 = T_1 - T_0$  and the event window as  $L_2 = T_2 - T_1$ .

### 4.2.2 DAILY DATA

The study uses daily stock data, with the main rationale being that merger announcements happen on a specific day and is thus best measured by using daily in preference of weekly or
monthly data. The tests that are conducted in this study are event studies using different datasets in determining abnormal returns to merging airlines and their rivals at the time of announcement. However, the use of daily data is not only anchored with the reasoning of merger events being separate days. According to Holthausen & Leftwich (1986), the use of daily data may increase the power of a test, which in an event study would possibly yield more significant positive or negative abnormal returns. On the other side however, Fama stated in his textbook, *Foundations of Finance* from 1976, that the use of daily data tends to diverge the data more away from normality than by using monthly data. In practice, this means that a daily study will yield more extreme values, resulting in a distribution with heavier tails, while the monthly data will tend to converge closer to the center of the distribution. Although monthly data might be a better fit in terms of normality, this comes at a cost in terms of relevant data, and the use of daily data to better describe single day events therefore trumps the use of weekly or monthly data.

### 4.2.3 EVENT WINDOW

With the knowledge of each date of relevant merger announcements, an event window must be set to fully analyze the occurrence of abnormal returns in relation to the event itself. To capture the full stock effect, without knowing whether all publicly traded information are available, it is necessary to analyze days both prior and past the announcement date (Campbell et. al., 1997). There could theoretically also be an issue with not knowing the time of day or whether the announcement happened on a weekend, but as neither intraday stock returns are applied nor any of the mergers happened during the weekend, this can be ignored.

The event window will omit a total of 31 days, starting 20 days prior to the announcement and ending ten days after the event, as practiced by Knapp (1990). While some other studies might argue for using only narrower event windows like Singal (1996), I will anchor my choice of event window according to Knapp (1990). As his research is directly relatable to this study, I find his seven event windows to be a better fit, as they paint a broader picture of the analysis in comparison to Singal which performs a combined study of stock and airfare analysis. These seven event windows are as follows:

[-20, +10], [-20, 0], [0, +10], [-10, +5], [-3, +3], [-1, +1] and [0, 0].

The 'negative' days represent the number of days leading up to the announcement and the 'positive' days refer to days after the announcement is made public, while zero is the day of the announcement. With such a wide spread of event windows, it gives the study more options in terms of determining whether the abnormal returns actually happen on the announcement date or in days prior or following the actual event.

### 4.2.4 MEASURING NORMAL PERFORMANCE

In computing the abnormal returns the event window, there have to be a comparable return in order to analyze the effects. Therefore, the normal performance of the merging airlines and its rivals have to be computed, which can be done based on a statistical or economic approach. The first approach uses statistical assumptions regarding the behavior of stock returns without any specific economic implications. The latter model relies on factors defining the investor behavior, but needs in addition to apply statistical assumptions in order to be of practical use. While including economic factors might make a model more precise, it also does require additional assumptions making the model more complicated and thus less applicable in the real world. Therefore, the statistical approach will be applied in this study, where there exist two similar return models.

#### 4.2.4.1 CONSTANT MEAN RETURN MODEL

Regarded the simplest of the two models, it assumes the mean stock returns to be constant over time as the name of the model implies. The return for security i at time t is presented through the following equation:

$$R_{it} = \mu_i + \varepsilon_{it}$$
 where  $E[\varepsilon_{it}] = 0$  and  $Var[\varepsilon_{it}] = \sigma_{\varepsilon_i}^2$ 

In the formula,  $R_{it}$  represents the return for asset *i* at time *t*, while  $\mu_i$  displays the constant mean of the asset. The change in return from time *t* to t + 1 is given by the error term  $\varepsilon_{it}$  with a zero mean but a variance of  $\sigma_{\varepsilon_i}^2$ . Despite being a simple model, it does tend to yield more or less equal results compared to more complicated models. Using nominal data as in this study, the model is better applicable for daily data.

### 4.2.4.2 MARKET MODEL

In contrast to the previous model, the market model relates all stock returns to the market portfolio. Being a linear model, it follows the assumption of normality of stock returns on a joint basis. The return for stock i can therefore be described as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$
 where  $E[\epsilon_{it}] = 0$  and  $Var[\epsilon_{it}] = \sigma_{\epsilon_i}^2$ 

Equal to the constant mean return model, the  $R_{it}$  describes the return for asset *i* at time *t*, while  $R_{mt}$  represents the market portfolio chosen to be the S&P500 Composite Index. The  $\alpha_i$  and  $\beta_i$  are the regression constant and coefficient, while  $\epsilon_{it}$  is the error term, with an expectation of zero and variance  $\sigma_{\epsilon_t}^2$ . The model represents an enhancement over the constant mean return model by decreasing the variance of the abnormal returns as a result of allocating a proportion of the stock returns to the market portfolio.

#### 4.2.4.3 ECONOMIC MODELS

The most common economic models available are the capital asset pricing model (CAPM) and the arbitrary pricing model (APT). What both these have in common are that they rely on a greater number of assumptions that its statistical counterparties. While the CAPM was the preferred measure of normal performance of event studies in the 1970's, it is today seen as too complex and restricted by the required number of assumptions. The APT however is still in use in event study research, but is being less common due to the same rationale as the CAPM (MacKinlay, 1997).

### 4.2.5 SELECTION OF MODEL

The default setup when choosing model has been to start with the market model, as described by Skovmand (2013). This is also the method applied by Singal (1996). It is the simplicity that makes the rather simple market model trump its more complicated economic models. A study by Brown & Warner (1980) found evidence that the use of more complicated models did not seem to improve the reliability of event studies, and thus marked a shift from using economic models to applying statistical models. Hence, the market model will be the preferred measurement of normal performance in the study. To apply the market model to the dataset, the method of ordinary least squares (OLS) will be used to perform the regression estimating the normal performance of the stocks, where the stocks will be regressed against the S&P 500 Composite Index representing the market.

### 4.2.6 ESTIMATION WINDOW

The estimation window represents the time frame in which the normal performance through the market model is calculated. It is important that the estimation window and event window do not overlap, as this would bias the expected return by returns observed in the event window. The purpose of the estimation window is to portrait the normal performance of the stock, excluded from any merger or similar announcement events (Benninga, 2008). Furthermore, the use of daily data makes the study include a larger amount of 'outliers' in comparison to using monthly data. However, as already described, daily data is the preferred choice of the study, and thus the estimation window needs to have a sufficient number of days to achieve a representable estimate of the normal performance of the stock (Fama, 1976).

While typical estimation windows in text books and the academic literature consist of around 120 trading days (Campbell et. al., 1997), this study chooses to use a significant higher number of days. The start date of the estimation window is at -270 trading days as  $T_0$  with a total of 250 trading days in the estimation window  $(L_1)$  which corresponds to the number used by Singal (1996). By applying a wider horizon, the regression estimating the normal returns among the airlines should be able to better eliminate seasonal swings, which are crucial in the airline industry. Looking at a year total of  $\approx 250$  trading days, the effects of a busy summer increasing the stock price or winter storms pushing the value down will be given less weight and therefore be a better fit in the event study model.

With the event window previously presented, and the event itself declared as the announcement date of an airline merger, the full horizon of the event study to be performed in this study can be illustrated through figure 3:

Figure 3: The timeline of this event study



Source: Inspired by Campbell et. al. (1997)

### 4.2.7 MEASURING ABNORMAL RETURNS

When the formalities of settling the definition of the event, estimation and on what basis the data will be selected, the calculations of normal and abnormal returns may commence. While the normal return of each airline is calculated in the estimation window, the abnormal return is given as the actual return in the event window minus the normal return.

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

Under the null hypothesis, the abnormal return is expected to equal to zero. Thus, the residual return is assumed with normality with zero mean and conditional variance.

$$AR_{it} \sim N(0, \sigma^2(AR_{it}))$$

This gives us the following calculation for the variance.

$$\sigma^2(AR_{it}) = \sigma_{\epsilon_i}^2 + \frac{1}{L_1} \left[ 1 + \frac{\left(R_{mt} - \hat{\mu}_m\right)^2}{\hat{\sigma}_m^2} \right]$$

The expression converges towards zero when  $L_1$  increases, which also decreases the serial correlation between the abnormal returns. With an estimation window of approximately one

year, this implies  $L_1 = 250$  which should be a sufficiently high number of trading days in the estimation period in assuming normality in the data sample.

However, only calculating the abnormal return at time t for each airlines i is not sufficient to perform an event analysis. The abnormal returns have to be first cumulated, then averaged in order to have explanatory power if a data sample and not just each single case. The abnormal returns are aggregated to cumulative abnormal returns for the relevant days in the event window  $(T_1 < \tau_1 \le \tau_2 \le T_2)$ .

$$CAR_i(\tau_1,\tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{it}$$

where  $\tau_1, \tau_2$  represent the first and last day included from the event window. The corresponding variance of the cumulated abnormal return is computed as follows:

$$\sigma_i^2(\tau_1, \tau_2) = (\tau_2 - \tau_1 + 1)\sigma_{\epsilon_i}^2$$

With the individual  $AR_i$ 's assumed to be normal distributed, we have the following assumption under the null hypothesis for the cumulated abnormal returns.

$$CAR_i(\tau_1,\tau_2) \sim N(0,\sigma_i^2(\tau_1,\tau_2))$$

In the same manner as for the individual abnormal returns, the cumulated abnormal returns for each airline are conditional on the market return and are assumed to be jointly following a normal distribution with zero mean and a conditional covariance matrix when  $L_1$  is high.

Finally, the abnormal returns will be summed and averaged across asset *i*, in this case each individual airline. This will give the cumulated average abnormal return from  $\tau_1 + 1$  to  $\tau_2$  for every airline included in the respective tests.

$$\overline{CAR}(\tau_1, \tau_2) = \frac{1}{N} \sum_{i=1}^{N} CAR_i(\tau_1, \tau_2)$$

The same technique applies in finding the average cumulative variance for the data:

$$var(\overline{CAR}(\tau_1,\tau_2)) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_i^2(\tau_1,\tau_2)$$

The value of the cumulated average abnormal return is the equally weighted abnormal return for all airline stocks included in the test. There does exist one similar approach to  $\overline{CAR}$  in determining the cumulative abnormal returns. Instead of merely summing and dividing each abnormal return, these could be standardized using the standard deviation of the individual stock. Dividing every  $CAR_i$  by the estimated standard deviation for asset *i*, the result would be  $SCAR_i$  (standardized cumulated abnormal return) which could be summed and averaged as already illustrated to get  $\overline{SCAR}$ . However, as one usually have to choose between either one of these two measures when performing an event study, the study follows the 'regular' computation of cumulated average abnormal returns as the returns among the different merging airlines and rivals not are assumed to be constant.

### 4.2.8 THE JOINT TEST

When testing stocks separately, applying the students t-test is as a natural way of understanding if the returns of a particular test are significant or not. As we in this study deal with multiple stock values at the same time, it is necessary to perform a joint test as we want to determine if the cumulated abnormal return of the relevant stocks is significant. This test is also mentioned by Campbell et. al. (1997), and is commonly referred to as the J-test. To form the test statistic of the J-test, the cumulated average abnormal returns in addition to an estimator of the variance are applied. The J-test use an assumption that there is no overlap between the event windows of the airline stock announcements. We are therefore able to make a conclusion of the variance for the cumulative abnormal returns as they under the null hypothesis are expected to be zero:

$$\overline{CAR}(\tau_1,\tau_2) \sim N(0, var(\overline{CAR}(\tau_1,\tau_2)))$$

In our dataset, the term  $var(\overline{CAR}(\tau_1, \tau_2))$  is unknown, but in line with the argumentation in this chapter, it is possible to use the estimated variances among the airlines as an estimator.

Furthermore, the Slutsky's Theorem (Slutsky, 1925) can be applied in order to calculate the test statistic  $J_1$  in the following manner:

$$J_1 = \frac{\overline{CAR}(\tau_1, \tau_2)}{\sqrt{\overline{\sigma}^2(\tau_1, \tau_2)}} \sim N(0, 1) \text{ when } N \to \infty$$

This test statistic will however give an asymptotic result, as the  $J_1$  is not t-distributed for small samples. With the datasets presented in this study being of different size, an approximation towards the normal distribution will yield best possible results.

To be able to apply the test statistic in determining the significance of abnormal returns, there needs to be one or more alternative hypotheses to oppose the null hypothesis. There will be performed two sets of event study analyses in this thesis, based on the hypotheses presented in chapter 3.4. One will be looking at the airlines involved in the announced mergers, while the other will look at the merging airlines' rivals. In line with the two main focus areas and hypotheses presented for this study, this gives us two sets of null- and alternative hypotheses.

$$H_{01}: \overline{CAR} = 0 \qquad \qquad H_{02}: \overline{CAR} = 0$$
$$H_{A1}: \overline{CAR} > 0 \qquad \qquad H_{A2}: \overline{CAR} \neq 0$$

From previous research by Knapp (1990) and Singal (1996), the airline industry is proven to generate positive abnormal returns for both target and acquiring firm when an announcement is made. However, as available studies only include mergers up until 1988, this study aims to understand if the trend following the deregulation of the airline industry is still viable. Therefore, it will be appropriate to perform a one-sided regression analysis on the abnormal returns as the intuition already is set on positive returns for both target and bidder.

As previous literature has had different outcome when it comes to the performance of rivals in the event of an announcement by two competitors, it is not necessarily clear if we are looking for positive or negative abnormal returns. While Knapp (1990) found positive abnormal returns for rivals in the U.S. airline industry among nine mergers in 1986, Eckbo (1983) did not find this evidence in his study of the manufacturing industry, which also had a substantial amount of companies included. Therefore, it will be natural to start off the tests of the rival firms by performing a two-sided test in order to see whether their results are different from zero in either a positive or negative manner.

Finally, the p-values can be calculated on the base of the test statistic, using the normal distribution and relevant quantiles. For the one sided tests, solely values of  $\alpha$  in the normal distribution will be used as threshold, while values of  $\alpha/2$  are applied as threshold on each side of the bell curve in the two sided test. The three levels of confidence will be marked with asterisks in the tables presented, illustrated as \*/\*\*/\*\*\* for 90% / 95% / 99% respectively.

Table 1: Confidence levels to determine statistical significance

<b>Confidence level</b>	90 % *	95 % **	99 % ***
$z_{lpha}$	1.282	1.645	2.236
$Z_{lpha/2}$	1.645	1.960	2.575

As explained under the previous chapter, there exist an alternative approach in generating cumulative abnormal returns (SCAR). This has a corresponding test statistic  $J_2$ , with its test statistic being calculated slightly different than the  $J_1$ , but with a similar interpretation. Where  $\overline{CAR}$  was preferred in favor of  $\overline{SCAR}$ , the selection criteria for the test statistics are based on power. As this study involves both one and two-sided tests, there will be several thresholds for statistical significance for the J-parameters, presented in table 4.1 above. The higher the value of either  $J_1$  or  $J_2$ , it is preferable to choose the one with the highest value, and thus power (Campbell et.al., 1997). In most cases, the different tests in this study led to  $J_1 > J_2$ , implying stronger power which strengthens the decision of using the regular determination of abnormal returns, rather than the standardized.

## 4.2.9 WILCOXON NON-PARAMETRIC SIGN TEST

The event analysis assumes the abnormal returns to be normal distributed, or in other words following a parametric distribution. Despite the assumption of normality in order to be able to perform necessary calculations, it is reason to believe that the samples in reality are not normal distributed. A non-parametric sign test investigates the distribution of negative and positive abnormal returns, which in contrast to the event study methodology only assumes a symmetric distribution for the returns, and not the Z- or T-distribution. In situations where

there may be doubt around the results from the event study tests themselves, the nonparametric test may give an indication of whether the event study results can be accepted or not. The methodology is based on having a null-hypothesis implying that there are an equal amount of positive and negative abnormal returns in the distribution, illustrated by the letter  $\pi$ . The alternative hypothesis will thus be looking either at the negative side of the distribution, implying that there are more negative abnormal returns than positive ones. This is intended to be a second 'check' to reject or accept the market power hypothesis, and the signage in the alternative hypothesis is based on the general M&A consensus, excluding Knapp (1990).

$$H_{0_{Wx}}: \pi = 0.5$$
  
 $H_{A_{Wx}}: \pi > 0.5$ 

Following the set of hypotheses, one have to define the number of sample  $CAR_i$ 's larger, or below zero as will be relevant in this study, notated as  $N^-$ . Furthermore, the weighted variable of negative returns can be computed as  $\hat{\pi} = \frac{N^-}{N}$  which forms the test-statistic:

$$J_3 = [\hat{\pi} - 0.5] \frac{\sqrt{N}}{0.5} \sim N(0, 1)$$

The statistical significance of  $J_3$  will be determined in the exact way as the one-sided test presented above, using the same thresholds for statistical significance.

# 5 DATA AND PROCESSING

Performing an event study implies a large amount of data, which will be split into different sub-groups in order to find evidence for the one hypothesis or the other. This study includes large quantities of raw data, where decisions have been made in terms of which types of data are included and which are not. This chapter will give a brief overview of the process of getting from an idea of which data to include to the different sets of data that will be tested in the next chapter.

# 5.1 DATA COLLECTION

Having access to reliable and complete data is important in gaining a credible study. The raw data collected in this thesis is brought from The Center for Research in Security Prices (CRSP) database provided by Wharton University. This gives the study exactly the same available information as the ones used in Knapp (1990) and Singal (1996) among others. It is therefore possible to run tests in order to check whether this study reaches the same conclusions as them, in addition to go further in depth into other sub-groups and the newer available data.

Despite having access to worldwide data, the study will only use stock data from mergers by U.S. airlines. The total available stock data from the U.S. alone exceeds the total data from every other country combined when it comes to airline mergers. This data is collected on time windows including a 250 trading day estimation window plus a 31-day event window. Where there have not been sufficient data, airlines are left out of the analysis. The lack of data has mainly been due to two separate reasons. First, some airlines in the 1980's were lacking a full estimation window. Second, in more recent years, the situation of financial distress and thus bankruptcy has led many target airlines to not have available stock data neither at the time of merger announcement nor the estimation window.

With a decent amount of available U.S. stock data, the number of airlines involved in an M&A transaction ticks in at exactly 62. With recent years being impacted by bankruptcies, the distribution between acquiring and target firms is not equal. Of the total 62 airlines, 36

are bidding firms while 26 are in the target firm category. To perform a relevant event study, Bechmann (2016) states that there should be at least 30 observations in the test. While this of course is an ideal minimum requirement, it is not always possible to reach. Therefore, with the backing of previous studies like Singal (1996) with as little as 14 airline stock observations in some cases, tests with a lesser number of observations will be included.

For the market portfolio, there exist two options. Either a value-weighted industry portfolio could be used, or a benchmark index representing the economy as a whole, such as the S&P 500 Composite Index. With the purpose of both market indices being to perform an OLS regression, their end result will be less sensitive when the number of observations increase. Furthermore, computing a value-weighted index is both time consuming and would unfortunately have represented a decreasing number of input airlines in this study. As the observations used in this study have a span of horizon of more than 30 years, the S&P 500 Composite Index will represent a total U.S. market for all time periods, while an industry index only containing airlines will represent an industry which have changed significantly over the given time period. Additionally, with the number of available airline data in the U.S. industry on the decline over the horizon of the study, the value-weighted portfolio would be too small in the later years of the study compared to the S&P 500.

# 5.2 TYPES OF AIRLINES

No mergers are the same, neither in the airline industry nor in other branches of the market. It will therefore be slight differences in the pure transaction among some of the airlines included in the total dataset. For instance, where an airline like American Airlines was saved from bankruptcy in the merger with US Airways in 2013, it has acquired numerous airlines in the past to in order to expand. Other airlines like Northwest and Delta are a result of a consolidation between two comparable entities. There is an over-representation in the collected data of the traditional legacy carriers. Over the time period, some of them have either acquired or merged more than half a dozen times each. On the other side, the data from the 1980's represents a higher number of smaller, mainly regional airlines that ended up being consumed by the larger trunk carriers.

Shortly put, the dataset represents everything from regional carriers to some of the world's largest airlines. In addition, some low cost carriers have also made the way into the raw data. There will not be made distinctions between the different types of airlines involved in the study, but rather dependent on transaction type. Thus, there will be made a distinction in whether the airline was the acquiring or target firm in the transaction, or whether the intention of the M&A was consolidation or a pure takeover. Although, in most cases the available data will be analyzed jointly to paint the bigger picture of whether one may expect abnormal returns from a merger announcement, and whether consolidation is affecting collusive pricing on a market basis and not just in a few lone cases. Collective analysis also improves the number of observations which in most cases are sufficient, but which do not have the luxury of being split into an infinite number of sub-groups.

Acquired - acquirer	Announcement	Acquired - acquirer	Announcement
Mississippi Valley Airlines - Air Wisconsin	January 30, 1985	Morris Airlines - Southwest Airlines	December 13, 1993
Muse Air - Southwest Airlines	March 11, 1985	AirTan Airways - ValuJet Airlines	July 11, 1997
Frontier Airlines - People Exp. Airlines	September 20, 1985	Reno Air - American Airlines	November 19, 1998
<b>Empire Airlines - Piedmont Airlines</b>	September 26, 1985	Atlantic SE Airlines - Delta Air Lines	February 16, 1999
Republic Airways - Northwest Airlines	January 24, 1986	Comair - Delta Air Lines	October 18, 1999
PBA - People Express Airlines	February 3, 1986	Trans World Airlines - American Airlines	January 10, 2001
Eastern Air Lines - Texas Int'l Airlines	February 24, 1986	Shuttle America - Republic Airways	April 22, 2005
<b>Ozark Air Lines - Trans World Airlines</b>	February 28, 1986	US Airways - America West Airlines	May 19, 2005
People Exp. Airlines - Texas Int'l Airlines	July 3, 1986	Atlantic Southeast Airlines - SkyWest	August 15, 2005
Jet America Airlines - Alaska Airlines	August 7, 1986	Colgan Air - Pinnacle Airlines	January 18, 2007
Western Airlines - Delta Air Lines	September 10, 1986	ATA Airlines - Southwest Airlines	November 19, 2008
AirCal - American Airlines	November 18, 1986	Northwest Airlines - Delta Air Lines	April 14, 2008
Horizon Air - Alaska Airlines	November 20, 1986	Midwest Airlines - Republic Airways	June 23, 2009
Pacific Southwest Airlines - US Air	December 9, 1986	Frontier Airlines - Republic Airways	August 14, 2009
Piedmont Airlines - US Air	January 28, 1987	United Airlines - Continental Airlines	May 3, 2010
Florida Express - Braniff Int'l Airlines	October 23, 1987	Mesaba Airlines - Pinnacle Airlines	July 1, 2010
		ExpressJet Airlines - SkyWest Atlantic	August 4, 2010
Wings West Airlines - American Airlines	April 19, 1988	AirTran Airways - Southwest Airlines	September 27, 2010
<b>Command Airways - American Airlines</b>	June 14, 1988	American Airlines - US Airways	February 14, 2013
Simmons Airlines - American Airlines	June 21, 1988	Virgin America - Alaska Airlines	April 4, 2016

Tuble A. The antimed menuacu me create brau	Table	2:	All	airlines	included	in	event study
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## 5.3 DELIMITATIONS

To make the study more reliable and comparable to previous research, the decision to leave out non-U.S. airlines have been made. It most certainly would have been interesting to compare results from the rest of the world with the American market, but for now, this will be excluded. One main reason for this is the access to data, while another being comparability. While there have been quite a number of airline mergers outside the 50 states of the U.S., the data is not as easily accessible for many of the markets. Even earning access to data from some European airlines turned out to be more difficult than one could imagine. Furthermore, with a data sample solely consisting of U.S. airlines, they are not only more comparable as they operate in the same market, but they are also regressed against the same benchmark index in determining normal performance of the stocks. Including foreign carriers would imply a basket full of different benchmarks, each representing either a nation or region in determining the normal performance. Therefore, out of rationality and simplicity, only U.S. airlines are included in the study.

Probably the most important limitation however, is the exclusion of data before the year 1985. While the Deregulation Act was signed by president Jimmy Carter on October 24<sup>th</sup> 1978, the Civil Aeronautics Board (CAB) was not fully dissolved until the first day of 1985, meaning the industry was not fully liberalized until this point. Despite the industry seeing drastically changes between 1978 and 1985, the government still had to some extent a say in the pricing of routes and which airlines should be able to fly to each specific destination. Therefore, it is natural to leave out data from this time period, in addition to data pre 1978, as it represents a different industry than the open skies of the last three decades.

By collecting a large number of data and manually creating datasets to be ran in almost a dozen separate tests, there does exist a risk of human error, in the form of a computational error. There may also be a question concerning whether the number of airlines included are considered a representative population. While the total of airlines included in most cases exceeds desired 'minimums' of how many observations one should include in an event study, there is still reason to believe that the data samples to some extent are too small in comparison to research performed on wither industries with more available data, or non-industry specific studies. However, for the rival analysis, the number of observations are significantly larger, and should not be of any concern. Additionally, in the previous research by both Knapp (1990) and Singal (1996), the total number of airlines included are less that what this study includes, and thus vindicated the number of observations in this study as valid.

# 5.4 CROSS-CORRELATION AND SKEWNESS

One common problem with cross-sectional event studies like this is that the abnormal returns often are cross-correlated, and especially for long-term returns (Brav et. al., 2000, Jegadeesh & Karceski, 2009). The prime reason for this effect is that both merging airlines and their rivals do share a common calendar period due to a long estimation window, as well as in a few cases sharing some of the same event window. Secondly, major economic events like merger waves in general or crashes like Black Monday may impact more than one observation. Finally, when looking at solely one industry, some of the effects on the stock price will come from industry-specific reactions to e.g. the oil price. This may lead to misinterpretation of test results, in addition to a too high rejection rate of the null hypothesis (Collins & Dent, 1984).

Another effect the cross-correlation may have on the data sample is a left-skewness (negative skewness) if the majority of the abnormal returns are positive, and the opposite effect if most of the numbers are negative (Mitchell & Stafford, 2000). Due to lack of independence between observations as they may share parts of the estimation window or even event windows, the results will be strengthened in the direction of the majority of the abnormal returns. Thus, according to hypothesis 1 of this thesis, we expect positive abnormal returns for both acquiring and target firms. If this is to be true, then there should in theory be a left skew in the dataset, as positive abnormal returns from one airline is included by another (Barber & Lyon, 1997). However, this only applies to the smaller samples, as we assume the data to be truly independent when N increases, and thus assumes normality. Therefore, the smaller samples will most likely be more affected by the skew effect than the larger samples looking at a larger horizon of time and hence yielding a larger number of observations.

# 6 RESULTS

In determining whether there is support for the market power hypothesis in the dataset, the data will have to be looked at collectively in order to reach one conclusion or the other. However, gaining the sufficient knowledge may be complex if looking solely at all data at the same time. Thus, all tests will first be analyzed separately before a joint conclusion will be reached. As the study is primarily related to the stock effect upon the announcement of an airline merger and acquisition, it is natural to start by interpreting the results of the airlines included in the M&A transactions themselves. With the research question also being focused on finding evidence of market power as a motivating component of airline mergers, the stock performance of the rivaling airlines will be analyzed subsequently. While there may be proposed sub-conclusions during the analyses, these are meant to clarify the effects imposed in each test and give the overall conclusion a more intuitive approach, and thus make the consolidated results easier to interpret.

# 6.1 DESCRIPTIVE DATA

In order to properly understand the results of the tests in this chapter, some descriptive statistics can be of necessity when it comes to how the distributions of the mergers affect the cumulative abnormal returns for each test. Primarily, the total number of mergers announcements included in the test is 39. This number is however not distributed evenly throughout the time period. With the first data dating back to 1985, and the most recent announcement took place in 2016, the average should be somewhere around 1.25 events annually. This is not the case, as the mergers are found in clusters rather than being evenly distributed, as shown in figure 2 below. Mergers and acquisitions traditionally follows trends, or 'merger-waves', while the airline industry U.S. in some way have created their own merger trends based on specific events or the general economic situation of the country.



Figure 4: Total number of yearly merger announcement in the United States

The first cluster is the post-deregulation time period, in the four years following the dissolving of the Civil Aeronautics Board. With the Department of Transport being the only law restricting enforcement at this time, none of the proposed mergers were stopped by the government, and many of the traditional 'trunk' carriers acquired smaller airlines to grow in size. This led to a series of extremely quiet years in terms of transactions in the early 1990's, before the latter years of the previous millennia saw a few merger announcements. Following the new century, the economy was hit by the dot.com bubble, in addition to the 9/11-attacks which in particular affected the industry. Following a number of bankruptcies, there have been an upswing in merger activity ever since in the U.S., with American Airlines being acquired by US Airways in 2013 as the last of the large legacy carriers affected by the restructuring Chapter 11 bankruptcy. The outlier here is the 2016 merger announcement between Alaska Airlines acquiring Virgin America, which are two well-performing airlines in contrary to the many financially distressed in the years preceding.

With a total of 39 mergers available, one would expect stock data for 78 airlines, consisting of 39 bidders and 39 target airlines. However, with stock data unavailable for most of the airlines in financial distress at the time of their respective mergers, and thus announcements of mergers, the total number of available data includes 62 M&A transactions, split into 36 acquiring and 26 target airlines. This uneven distribution is illustrated in figure 3 below, showing the post-deregulation cluster actually having more available data for target airlines

<sup>■</sup> Number of merger announcements

than bidding firms in the CRSP database, while it in recent years have been significantly more data from the acquiring firms. This is as previously explained, mainly due to the weak financial situation of the target airlines in the years following the late 1980's.



Figure 5: Available data of airlines involved in mergers in the United States

From the 39 mergers used in the analysis of cumulative abnormal returns for bidder and target airlines, 38 of these are used as proxy for the rival analysis. The only merger not to be included in the rival analysis is the Alaska/Virgin America merger of 2016 due to lack of available data for rivals. As the market in the first cluster was consisting of a larger number of players than the industry has today, the total number of rivals per portfolio were 16 at its maximum in 1985. With merger activity reducing the number of airlines operating faster than the rate of successful new airlines entered the market, the number of rivals per portfolio slowly fell to its lowest at merely five airlines both in 2007 and again in 2013. However, the airlines included in the rival portfolios do consistently represent the majority of U.S. airlines in terms of market share, and is thus assumed to be representative. Where the market back in the 1980's was represented by a large number of semi-large airlines, more than 70% of the domestic market is today represented by only four carriers. Additionally, the high number of airlines per portfolio do also create a good size of the different samples used in the rival analysis, potentially increasing the power of the tests to be performed.



Figure 6: Number of mergers used in rival analysis and average number of rivals

# 6.2 MERGING AIRLINES

The first data to be tested is the one including the airlines involved in the M&A transactions. Initially, the merging airlines will be split into bidders and targets. The academic literature generally agrees that target firms generate positive returns upon the announcement of a merger (Jensen & Ruback, 1983). However, while there have been evidence of positive abnormal returns for the bidder firms in the airline industry (Knapp, 1990), the acquiring firm is generally expected to generate low or none positive abnormal returns on the stock in the case of a merger (Jensen & Ruback, 1983). Furthermore, it may be interesting to gain an overall understanding of whether the airline industry differs from other industries by determining if there are overall positive abnormal returns in the dataset. Therefore, all merging airlines, both acquiring and target firms, will be included. With a clear anticipation of positive abnormal returns in the dataset on the basis of previous research as described in hypothesis 1, the one-sided test is applied for all tests in chapter 6.2.

### 6.2.1 BIDDER AIRLINES

The relevant research on airline M&A stock performance has yielded mainly positive results for acquiring firms in terms of positive abnormal returns. Both Knapp (1990) and Singal (1996) found positive abnormal returns for bidders, with only a few of the results not being significant. The expectations are thus of positive returns. From figure 3, it was clearly presented that the dataset contains a larger number of bidders than target firms, mainly due to the stronger financial position of the bidders. This makes 36 out of 39 bidder firms having available stock data at the time of merger announcement, in addition to a one-year estimation window. With N = 36 airlines, the selection above the desired minimum of 30 stocks as described by Bechmann (2016).

<b>Event window</b>	Abnormal returns	Normal return	$J_1$
[-20, 10]	0.072	0.010	2.15**
[-20, 0]	0.042	0.007	$1.56^{*}$
[0, 10]	0.060	0.003	3.14**
[-10, 5]	0.060	0.002	2.51***
[-3, 3]	0.034	-0.002	2.27***
[-1, 1]	0.036	-0.002	3.64***
[0, 0]	0.030	0.000	5.38***

Table 3: Abnormal returns of acquiring airlines between 1985 and 2016.<sup>1</sup> N = 36

From table 3, the findings clearly show that the acquiring firms on average have produced positive abnormal returns. With the abnormal returns being cumulative and averaged, the wider event windows increase the possibility of experiencing positive but also negative returns at some point in the data. However, as the expectation of positive returns seems to be true for the bidder airlines involved in the M&A transactions, this makes the wider event windows experiencing a higher number of positive values, and thus higher cumulated average abnormal returns than the narrower windows as a result. The normal return is the expected stock return, based on the normal performance from the estimation period, and a low normal return indicates a high actual return and vice versa.

The test statistics strongly increase as the event windows gets narrower, at the same time as the abnormal returns decrease to around three percent, as the volatility of the abnormal

<sup>&</sup>lt;sup>1</sup> A total of 36 acquirer airline merger announcements. See appendix 1 for complete list.

returns decrease. With a normal return of  $\approx 0$  for the narrowest event windows, the actual returns are almost equal to the abnormal returns. The verdict of these observations is an indication of evidence of significant merger announcement related gains also for acquiring airlines. This partially support the research by Knapp (1990) and Singal (1996), but contradicts studies performed in other areas such as the manufacturing industry by Eckbo (1983) which only find majorly non-significant abnormal returns for bidders.

### 6.2.2 TARGET AIRLINES

In quite a few cases, the target firms are in a situation of financial distress, often under the Chapter 11 bankruptcy code for 'reorganization'. These firms do not have an active stock value in the CRSP database, and hence have to be excluded from the tests. With a total of N = 26 target airlines, the number is below the minimum of 30 observations. However, with studies by both Knapp (1990) and Singal (1996) having performed tests using a lower sample than this, the target airline test will be included in this study. Most of the airline and general M&A literature supports the hypothesis that target firms generate positive abnormal returns on its stock upon a merger announcement (Hackbarth & Morellec, 2008). Similar to the expectation of the previous test, the anticipation is positive abnormal returns also here.

<b>Event window</b>	Abnormal returns	Normal return	$J_1$
[-20, 10]	0.533	-0.173	3.92***
[-20, 0]	0.461	-0.115	4.20***
[0, 10]	0.197	-0.062	2.52***
[-10, 5]	0.414	-0.104	4.22***
[-3, 3]	0.305	-0.042	4.93***
[-1, 1]	0.248	-0.018	6.18***
[0, 0]	0.125	-0.004	5.41***

Table 4: Abnormal returns of target airlines between 1985 and 2016.<sup>2</sup> N = 26

For each event window, the target firms achieve high cumulated average abnormal returns while being statistically significant. The high cumulated average abnormal returns in the first, second and fourth event window implies that the abnormal returns were generated leading up

<sup>&</sup>lt;sup>2</sup> A total of 26 target airline merger announcements. See appendix 2 for complete list.

to the event. Since the event windows are large, and the regression following the estimation window leading to negative normal returns, the abnormal returns gets artificially high. Looking closer at the event windows as they get narrower, the abnormal returns decrease while the test statistics increase. This is the same effect as in the sample of bidder airlines, indicating that the volatility decrease more than the cumulated average abnormal return. The observed abnormal returns are in line with previous studies in both the airline industry (Knapp, 1990, Singal, 1996), in addition to research from other industries (Eckbo, 1983).

Interestingly to note based the test of the target airlines, is the rather strong negative cumulative average normal returns observed. These are as previously mentioned based on the estimation window, and when these yield low values, they take their part in creating the high abnormal returns. As an example, the actual return in the widest event window is 36 percent, while the abnormal return is 53.3 percent. An explanation for this may be a difference in the economic situation of the target firm leading up to the merging announcement. While some of the targets were airlines that formed consolidating partners to their acquirers, others were in a situation of financial distress and were merely bought by its acquiring airline, making it a takeover. Therefore, the dataset of target airlines will be split into those included in a takeover and those of a consolidation. Despite the sample size may be smaller than desired, it is still on par with some of the samples found in Singal (1996).

Event window	Abnormal returns	Normal return	$J_1$
[-20, 10]	0.845	-0.408	3.18***
[-20, 0]	0.661	-0.278	3.08***
[0, 10]	0.275	-0.141	1.80**
[-10, 5]	0.570	-0.232	2.98***
[-3, 3]	0.350	-0.091	2.90***
[-1, 1]	0.267	-0.043	3.41***
[0, 0]	0.091	-0.011	2.03**

Table 5: Separation of takeovers of targets between 1985 and 2016.<sup>3</sup> N = 13

<sup>&</sup>lt;sup>3</sup> A total of 26 targets including 13 takeovers and 13 consolidations. See appendix 3 for complete list.

<b>Event window</b>	Abnormal returns	Normal return	$J_1$
[-20, 10]	0.221	0.061	3.72***
[-20, 0]	0.261	0.047	5.43***
[0, 10]	0.118	0.017	3.46***
[-10, 5]	0.258	0.024	6.02***
[-3, 3]	0.260	0.007	9.62***
[-1, 1]	0.229	0.006	13.06***
[0, 0]	0.158	0.002	15.69***

Table 6: Separation of consolidations of targets between 1985 and 2016. N = 13

i.

The new test indicates that target firms in the case of a takeover may have performed poorly due to the low stock returns over the 250 trading days leading up to the event window, and thus gained a strong abnormal return. Especially for the widest event windows, the effect of extremely negative normal returns makes the abnormal returns especially high for the airlines taken over. For the firms acquired in the case of consolidation however, the effect of poor performance in the estimation window does not seem to have the same strong impact. As the event windows narrow, the abnormal returns of the takeover and consolidation airlines get more aligned. There is one more thing that sets the two tests apart. Where the test statistic increases as the event windows gets more narrow for the consolidation targets, this is not the case for the takeover targets where the test statistic remain more or less the same. The interpretation of this can be explained with the normal return being volatile, and thus yielding very high abnormal returns for the widest event windows. As the normal return lowers, the same does the abnormal return, but at the same rate as the standard deviation. For the consolidation targets, the volatility decreases at a higher pace than the abnormal returns as the event windows narrow, which eventually yields stronger test statistics.

In achieving the intuitive interpretation of a test, presenting numbers merely in a table may not be the most pedagogic approach. Additionally, the average cumulating returns may paint an unrealistic picture of the abnormal returns, making them seem either artificially high or low. Therefore, a graphical presentation of the non-average cumulative abnormal returns gives an overview of what is presented in the tables in a more illustrative manner.

In the case of the target airlines, the abnormal returns after dividing them into takeovers and consolidations yielded notable different numbers. While this effect was explained by the poor

performance of the target airlines being bought by the regression based on the returns from the estimation window, the daily actual returns also have some interpreting power. In the graph below in figure 2, the peaks at t = 1 and t = 0 are more or less equal to the two subgroups. However, the airlines being taken over deliver more positive results in the period leading up to and succeeding the event in contrary to the consolidating airlines which merely produce positive returns in this window, except of the few days prior to the announcement.

0,2 0,15 0,1 0,05 0 -18 -16 -14 -10 -8 -6 -2 0 2 Q -20 -4 10 -0,05 Consolidation Takeover



Adding the EMH to the discussion, there seems to be evident that the airlines taken over have benefited from the merger announcements to a large degree also in the days leading up to the event. This could be an effect of information leaked to the market, or simply that the mergers between the involved airlines were anticipated by the market. Either way, this case shows what difference the financial (and thus often operational) situation of a company in the estimation window can do to the abnormal returns in the event window. This may affect the explanatory power of the abnormal returns, as they are determined by the normal returns.

### 6.2.3 ALL MERGING AIRLINES

The consolidated test of bidders and targets yields results corresponding to expectations in regards to previous studies on mergers and acquisitions in the airline industry. When all airlines are included, the total number of merger announcements in the U.S. stock market are

N = 62. This is a higher selection of airlines than both Knapp (1990) and Singal (1996), and exceeds the minimum of 30 single events in performing an event study. Following the results from both previous research and the tests already performed in this study, the result should be significant and positive cumulative average abnormal returns for all seven event windows.

<b>Event window</b>	Abnormal returns	Normal return	$J_1$
[-20, 10]	0.256	-0.057	4.28***
[-20, 0]	0.212	-0.038	4.38***
[0, 10]	0.114	-0.021	3.33***
[-10, 5]	0.206	-0.040	4.77***
[-3, 3]	0.148	-0.019	5.44***
[-1, 1]	0.128	-0.012	7.25***
[0, 0]	0.070	-0.002	6.88***

Table 7: Abnormal returns of bidder and target airlines between 1985 and 2016.<sup>4</sup> N = 62

The expectations were positive abnormal returns, which the test yielded in all seven event windows. Each abnormal return is also significant on a 1 percent level. All the normal returns yield negative numbers, implying that the expected return based on the estimation window is low for the included airlines, which we know is largely due to low-performing takeover targets. Following the previous tests, the abnormal returns decrease as the event windows gets narrower, while the test statistics simultaneously increase. On a general basis, the additional returns exceeding the few days omitting the announcement itself seems to be generated preceding rather that succeeded. However, the high test statistics clearly represent the trend from figure 5 which showed that the abnormal returns peaked around days t = -1 and t = 0. Overall, there exist evidence in the dataset that airline merger announcements throughout the last three decades have produced positive abnormal returns for airlines involved, on average.

<sup>&</sup>lt;sup>4</sup> A total of 39 airline merger announcements, consisting of 36 bidders and 26 targets. See appendix 4.

Figure 8: Abnormal returns of target airlines



The tables in which the test results have been presented describes the abnormal return as cumulated and averaged, while illustrating it graphically, the data presented is not averaged. Figure 6 above shows the evolvement of cumulated abnormal returns for the three main tests ran so far. The target airlines clearly have the highest spike on the day before and the day of the announcement, while the bidders do not have the same excessive results. Where the targets have on average abnormal returns of above twelve percent, the bidders merely have around three percent. The graph also illustrates why the event windows seemed to show that abnormal returns were present in the days leading up to the merger announcement rather than in the days following.

# 6.3 RIVAL AIRLINES

Having observed positive abnormal returns for both bidder and target airlines, the study has so far been coherent with previous academic literature on the topic. However, finding evidence that holding airline stock in the time period omitting a merger generate positive returns is descriptive but not explanatory, and may seem more like an investment recommendation than an in depth analysis. Therefore, it is of interest to perform a series of tests on the stock return of a selection of rivaling airlines on the dates of the merger announcements presented earlier. Analyzing this data may lead to information concerning the market power hypothesis. The relevant questions to ask preceding these tests are whether airlines merge solely to improve operational performance, or if there might be a motivation of increased market power as an underlying factor. As there is uncertainty in whether the abnormal returns are positive or negative, the two-sided joint test will be used. Additionally, as the tendency reject the market power hypothesis has been the main consensus in academic literature in the general M&A research, the non-parametric sign test is applied to determine the occurrence of a higher number of negative returns than positive ones.

## 6.3.1 COHERENCE WITH KNAPP STUDY

In the research performed by Knapp (1990) and Singal (1996), the source of airline mergers is the years between 1985 and 1988. At this time the CAB was fully dissolved, and mergers in the airline industry saw little resistance from the Department of Transport which oversaw M&A activity alone until 1989, with a high number of M&A transactions as a consequence. There is one major difference in the two studies mentioned. Where Singal uses airlines from the entire time period of 1985-1988, Knapp only uses a total of nine mergers from 1986. Using a rival analysis on these mergers, Knapp has concluded with the presence of market power as a significant motivational factor for airline mergers which stands in contrast to evidence from other industries from Eckbo (1983) among others. Therefore, to check the model used in this study for academic relevance, a test based on the exact rival airlines and merger dates is applied.

<b>Event window</b>	Abnormal returns	Normal return	$J_1$	$N^{-}$	$\widehat{\pi}$	$J_3$
[-20, 10]	0.020	0.052	1.20	64	0.538	0.83
[-20, 0]	0.009	0.035	0.65	75	0.630	2.84***
[0, 10]	0.019	0.018	1.98**	56	0.471	-0.64
[-10, 5]	0.030	0.023	2.53**	53	0.445	-1.19
[-3, 3]	0.011	0.002	1.52	64	0.538	0.83
[-1, 1]	0.011	0.000	2.38**	56	0.471	-0.64
[0, 0]	0.008	0.001	2.73***	55	0.462	-0.83

Table 8: Abnormal returns rival airlines from Knapp (1990)<sup>5</sup>. N = 119

<sup>&</sup>lt;sup>5</sup> A total of 9 mergers represented by 119 rival portfolios consisting 12 to 14 competitors per portfolio included in Knapp (1990). See appendix 5.

The numbers indicate that rivals do experience positive abnormal returns in the event window of the mergers of their competitors. However, the returns vary in the range of just above zero to roughly three percent, and the test statistic  $J_1$  is also weaker compared to the previous tests on the airlines themselves. The event windows with the highest powers are also the ones with some of the lowest abnormal returns, which reveal that the abnormal returns are generated in the days closest to the merger announcement itself. It is also worth mentioning that there are weak positive normal returns from the estimation period, making the actual returns achieved in the event windows higher than the abnormal returns. Additionally, the negative values of the  $J_3$  test statistic from the Wilcoxon sign-test indicate a higher number of positive than negative abnormal returns for the shortest event windows, mostly without yielding significant results.

As the abnormal returns are positive, this suggests that effects of airline mergers in 1986 may have been in the shape of increased market concentration with large airlines growing bigger, and thus price collusion on routes which lies in the middle of the gunfire of the merger. The results from the test supports the test by Knapp (1990) on the same data sample, in which he supports the market power hypothesis that airlines in this period merged with increased market power as a motivation and result. It has already been mentioned that none of the mergers in the years immediately after the dissolving of the CAB were challenged by authorities, and the high degree of consolidation can be seen as the airlines' response to the free market where they were able to set their preferred airfare on each route.

## 6.3.2 COHERENCE WITH SINGAL STUDY

The previous sub-chapter stated that Knapp and Singal operated with slightly different horizons of airline mergers in their studies. Having a larger time period of mergers, Singal (1996) uses 19 mergers rather than nine merges as applied in Knapp (1990). The difference is achieved by using rival returns from the time period 1985-1988 rather than only the year of 1986. One would expect the results to be fairly consistent, as both studies includes the same mergers, and the only difference being Singal including five more. Hence, in the slightly wider study the average abnormal returns to the rival firms of the merging airlines should be still positive, which they are. However, Singal (1996) describes slightly less significant abnormal returns than Knapp (1990). However, he reaches the same conclusion as the latter,

especially when including airfares into the equation. In line with the previous chapter, it is equally relevant to be able to test the data used by Singal (1996) to verify the results.

Event window	Abnormal returns	Normal return	$J_1$	$N^{-}$	$\widehat{\pi}$	$J_3$
[-20, 10]	0.021	0.031	1.93*	116	0.498	-0.07
[-20, 0]	0.010	0.016	1.16	130	0.558	$1.77^{*}$
[0, 10]	0.015	0.015	2.43**	114	0.489	-0.33
[-10, 5]	0.019	0.010	2.36**	113	0.485	-0.46
[-3, 3]	-0.002	0.003	0.45	130	0.558	$1.77^{*}$
[-1, 1]	0.003	-0.001	0.89	117	0.502	0.07
[0, 0]	0.004	0.001	2.38**	106	0.455	-1.38

Table 9: Abnormal returns rival airlines from Singal (1996)<sup>6</sup>. N = 233

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Aligned with expectations, the results yields for the majority positive abnormal returns, despite that three of these are not significant. Additionally, with the normal performance illustrated through positive normal returns for the six out of seven event windows, it indicates that the actual returns were even bigger. Although, with the majority of the values being significant, there seems to be a tendency towards positive abnormal returns. With the knowledge from the previous test on the 1986 rivals, the results from this test may imply that some rivals earn positive abnormal returns while some earn weakly negative abnormal returns. Furthermore, the  $\hat{\pi}$  parameter yields both values above and below 0.5, making it difficult to determine whether the majority of abnormal returns are positive or negative, but implying that the positive returns are stronger than the negative as the consensus from the test is positive. Eventually the results do follow the conclusions of Singal (1996), which also found positive abnormal returns with some significance by solely looking at the stock data.

<sup>&</sup>lt;sup>6</sup> A total of 19 mergers represented by 233 rival portfolios consisting 7 to 16 competitors per portfolio included in Singal (1996). See appendix 6.





From the graphical interpretation, one major factor that creates the large negative spike at t = -3 of the Singal line which is the effect of 'Black Monday' on October 19<sup>th</sup> 1987, three days before one of the merger events. However, if controlling for this event, the main results from the test are the same, and do not change any of the conclusions already made. The Knapp-only data experience high, positive abnormal returns at t = -8, -4, 0 and 5, while the total dataset of the Singal-study lies a bit lower in terms of abnormal returns, though with its highest spike at t = 0. To conclude the historical data of the late 1980's there seems to exist evidence from the stock returns that airline M&As at the time generated positive abnormal returns for rivals. These returns are an indication of market power through higher concentration in the market, which again may have resulted in collusive pricing between airlines. Furthermore, as not all abnormal returns were significantly different from zero, the benefits of improved operating excellence and merger-specific synergies do also seem to play an important part in strengthening the market position of the merged airlines.

## 6.3.3 ACCESS TO NEW DATA

After the merger-boom in the late 1980's, the number of M&A transactions in the industry fell drastically over the start of the next decade. With many airlines already having 'finished' their merger activity, the new market also consisted of fewer but larger players, which kept

the number of merger transactions low during the 1990's. Following came the new millennium, which brought a new wave of mergers in the U.S. airline industry, ignited by economic recession and a catastrophic terrorist attack. Airlines struggled to make profit, leading to bankruptcies and mergers in order to save the airlines involved. Although, even with a markedly longer time period, the total number of rival data available between 1993 and 2016 is lower than the number applied in the dataset equaling Singal (1996).

Event window	Abnormal returns	Normal return	$J_1$	$N^{-}$	$\widehat{\pi}$	J <sub>3</sub>
[-20, 10]	-0.050	0.027	1.91*	63	0.477	-0.52
[-20, 0]	-0.039	0.012	$1.84^{*}$	76	0.576	1.74**
[0, 10]	-0.025	0.012	1.67*	69	0.523	0.52
[-10, 5]	-0.045	0.004	2.35**	78	0.591	2.09**
[-3, 3]	-0.057	0.001	4.76***	90	0.682	4.18***
[-1, 1]	-0.031	-0.013	4.05***	86	0.652	3.48***
[0, 0]	-0.014	-0.002	3.12***	92	0.697	4.53***

Table 10: Abnormal returns rival airlines in the time period 1993-2016.<sup>7</sup> N = 132

The abnormal returns from the new airline merger data yields negative numbers for every event window. In the first three event windows the test statistic  $J_1$  is fairly low, while the three narrowest are significant on a 1 percent level. By excluding the [-20, 10] window, the  $\hat{\pi}$  parameter yields a majority of negative abnormal returns for all event windows, with five out of six being statistically significant. The last three  $J_1$  test statistics indicate that the negative abnormal returns from the new data material were generated in the days closest to the announcement event. Furthermore, the Wilcoxon test supports this with a percentage of almost 70 percent of the abnormal returns being negative at these even windows. The new data therefore presents evidence that the market power hypothesis should be rejected, and rather indicating that merging airlines have strengthened their position in the market making through efficiency gains and forcing competition out of the industry.

With the 1990's being relatively uneventful in the perspective of airline M&As, the years following the 9/11 attacks made the industry see a decline in traffic numbers in the U.S. and on a worldwide basis, which had the consequence of leading some airlines into bankruptcy.

<sup>&</sup>lt;sup>7</sup> A total of 19 mergers represented by 132 rival portfolios consisting 5 to 10 competitors per portfolio. See appendix 7.

Many of the mergers in this millennium have been motivated by 'saving' airlines from bankruptcy by merging with a competitor and together improve efficiency to be able to stay profitable as a new and larger airline. On the other hand, there have also been some mergers of pure consolidation, where neither parts have been in a situation of financial distress, but rather mergers based on a different underlying motivation than only recovery from Chapter 11 bankruptcy. However, the high number of bankruptcies in the industry in the beginning of the millennium was not solely a result of the 9/11 attacks. While legacy carriers operated in the same manner they had been doing for many years, newcomers saw their opportunity to take market shares, like value-market airline JetBlue. With airfares being in the decline, and legacy carriers operating inefficient too diverse fleets of aging aircraft, bankruptcy was inevitable for some players. This may explain why the abnormal returns has switched from positive from negative, as improving operational performance on the airline as a whole, and thus turn into a stronger challenger in the industry was seen as a last solution.

With every cumulated average abnormal return from the test being negative, they give the opposite interpretation in contrast to the tests based on the knowledge from the tests based on the data applied by Knapp (1990) and Singal (1996). For the airlines represented in the new data, it is likely to believe that there are efficiency gains embedded in the returns, as the growth of low cost carriers made the merging legacy carriers forced to improve operations to remain competitive. However, as new carriers have entered the market in recent years there are currently a large amount of airlines present in the U.S. Despite the relatively high merger frequency of the 2000's, it is difficult to believe that the market has been consolidated to such a degree that further mergers would lead to antitrust. On the other hand, a more likely explanation is that increased market pressure has led to significant improvements in operations, forcing some airlines out of the industry or into bankruptcy as they do not have the ability to compete profitably.

## 6.3.4 COMBINING ALL RIVALS

The rival tests have so far yielded varied results. Where the two first tests based on data in the time period between 1985 and 1988 provided similar results of positive abnormal returns, the new data from 1993 until 2013 showed a change to negative rival abnormal returns. In order to try to describe the overall stock market impact on rival airlines at the time of the mergers

of their competitors, all rival portfolios are included into one consolidated dataset. The large dataset will consist of different selections of rival airlines from the different time periods, in opposition to the previous test where the rivals were the rivals applied remained the same. This is a weakness in the joint rival test, alongside a very wide time horizon, as the most recent rival portfolios on average are only one third of the size of the rival portfolios from the post-deregulation period. Where the data of the late 1980's included many equally sized 'trunk airlines' companied by some regional airlines, the rival portfolios of today have fewer airlines included and are mainly consisting of huge, consolidated airlines with global presence. Besides these shortcomings, there still exists valuable knowledge to be learned from a test including all rivals previously applied in this study.

Event window	Abnormal returns	Normal return	$J_1$	$N^{-}$	$\widehat{\pi}$	$J_3$
[-20, 10]	-0.010	0.032	0.85	192	0.526	0.99
[-20, 0]	-0.006	0.017	0.62	204	0.559	2.25***
[0, 10]	-0.004	0.014	0.63	189	0.518	0.68
[-10, 5]	-0.004	0.006	0.44	194	0.532	1.20
[-3, 3]	-0.021	-0.003	3.86***	229	0.627	4.87***
[-1, 1]	-0.003	0.000	0.96	199	0.545	1.73**
[0, 0]	0.000	0.000	0.11	200	0.548	1.83**

Table 11: Abnormal returns of all rival airlines between 1985-2016. N = 365

The end result from the consolidated test is mostly non-significant negative cumulated average abnormal returns. Only one of the seven event windows, [-3, 3] is significant, probably being a result of strong, negative returns related to 'Black Monday' in October 1987. The normal returns are for the most part positive, indicating that the actual returns in the event windows turned out lower than the normal performance. Furthermore, the negative abnormal returns are backed up by the non-parametric sign test which shows the  $\hat{\pi}$  parameter having the percentage of negative abnormal returns > 0.5. The Wilcoxon test does also show statistical significance for four out of seven event windows, indicating an overall trend slightly towards negative abnormal returns among the total of 365 observations.

Over the three decades, the data have represented two different views on abnormal returns for rival airlines. This makes the consolidated test ending somewhere in the middle, as the 1980's data represent 233 observations with a positive result and 132 observations with a

clearly negative result from the new data material. Having two contrasting trends from two different periods of time, the concerted result does not show neither of the previous effects, except a weak tendency towards negative abnormal returns overall from the Wilcoxon test. This makes is harder to interpret the presence of market power or other effects from airline consolidations. However, taking only the results from the last test into account, some verdict can be written. With the abnormal returns on average not being different from zero over three decades and 365 observations, they indicate that rivals do not experience benefits nor disadvantages from industry mergers. Instead, the numbers suggest that rivals on average will be unaffected by competitors' mergers as their effects are mainly transaction-related synergies and other gains such as tax savings and cost optimization, only benefitting the merging airlines themselves.





Figure 8 clearly shows that the test consisting all rivals on average is close to zero, with the most dramatic abnormal returns being in the area of merely half a percent plus/minus. The abnormal return on the day of the announcement is  $\approx 0$  in the consolidated test, while the 1980's data show a slightly positive return. However, for the newest data from 1993 until today, the abnormal return at the time of announcement is almost -2 percent. The high volatility in the newest data is actually created mainly from data preceding 9/11, while the

data succeeding was generally closer to zero in the wider event windows.<sup>8</sup> Furthermore, the pre 9/11 data also features the majority of the negative returns illustrated by the downward spike in figure 8 at t = 0 to t = 2, clearly indicating disadvantages for the rivals of merging firms. This strong and negative effect from the most recent data seems to outweigh the effects of the positive abnormal returns on the days around the announcement for the 1980's data, indicating a tougher and more competitive industry in the last two decades than three decades ago when the CAB was fully dissolved.

# 6.3.5 CONSOLIDATED RESULTS

## 6.3.5.1 MERGING AIRLINES

When looking at all tests performed using the dataset containing merging airlines, there exist evidence of positive and significant abnormal returns for both the target and bidder airlines involved in a M&A transaction upon the announcement event. This applies for both the post-deregulation period in the 1980's, in the next decade, as well as in the recent millennium, which despite being plagued with bankruptcies do generate positive abnormal returns for both parties involved in an airline M&A. The results support to a large degree the conclusions reached by previous research on the topic, with expected returns for target firms being around 25 % in the few days omitting the event, and bidding firms yielding a weak positive abnormal returns.

However, there are some results that make this study reach different conclusions than what is found in already published material. Where both Knapp (1990) and Singal (1996) found evidence of positive abnormal returns for acquiring firms, these were small and in a few cases statistically insignificant. By having a larger available sample of airlines due to the concept of time, this study shows that by including more airline merger announcements from the U.S. airline industry, the abnormal return for bidding firms have gone from being weak and occasionally insignificant, they are now significant at a 1 percent level in five out of six event windows and have increased slightly. While still being < 5 percent for the three shortest event windows, it still represents a change in return generation for acquiring firms.

<sup>&</sup>lt;sup>8</sup> See appendix 9, 10 and 11 for additional tests.

Looking back at the general literature on stock returns of M&A transactions, it has been concluded by Jensen & Ruback (1983) and Hackbarth & Morellec (2008) that takeovers do generate higher returns for the target firms. By splitting the number of target firms into two groups, the results showed that while consolidating firms experienced high abnormal returns, it could not compare with the firms being taken over, even if the sample was too low to be fully satisfying in that particular case. However, the fact that many of the firms taken over did produce very low normal 'expected' returns as a result of poor performance in the estimation window, made the abnormal return significantly higher than the actual returns achieved in the same period of time.

If comparing the abnormal returns of the target airlines seen over the full three-decade horizon to the results reached by Knapp (1990), the abnormal returns for the shorter event windows are more or less the same, while the ones from the wider event windows not are as extreme as the ones found in his research. Going back to the efficient market hypothesis, this may be explained as the market of today being more unpredictable in terms of information of a merger preceding the announcement, or if the market is reacting less to eventual leaked information in advance. With returns in the few days omitting the announcement being consistent, there is reason to believe that the target airlines perform similar today as they did three decades ago. However, the amount of publicly available information in the market or the anticipation of mergers may have changed.

## 6.3.5.2 RIVAL AIRLINES

From the results yielded from the final test of the rival airlines, it was hard to reach a firm conclusion of the statistical significance of whether the abnormal were different from zero or not, even though the Wilcoxon test showed a higher number of negative returns, in line with expectations. Therefore, looking solely at the large dataset represents different periods of time with conflicting results, which in the end makes us have doubt if there are any clear effects to be observed among the rivals. Although, the weak tendency towards negative abnormal returns among rivals may imply that the newly formed airlines through the proposed mergers are stronger industry competitors through efficiency gains. In addition to this, the is also a possibility of the merged airlines to have gained a sufficient proportion of the market share that they force competition out of business for different reasons. These
could either be increased entry barriers or inability to compete against the strongest airlines on economies of density or scale, despite the synergy effect of scale is disputed (Caves et. al., 1984). However, as the total effect is rather weak, the merger effects on merging airlines are most likely to occur from gains (or losses) specific to the merger itself, such as labor, fleet or tax optimization. For the rivals, the overall three-decade effect seems to only be slightly negative in terms of the degree of impact from industry mergers.

The thing that excites however, is the fact that while the test of the rivals used by Knapp (1990) and Singal (1996) yielded positive returns for the rival firms, the more recent data shows the opposite. Even though the results did not imply statistical significance for all event windows of the 1980's, the tendency is still clearly positive. It also exists a reasonable explanation to the Knapp-test results. In the year of 1986, many of the most significant mergers saw regional airlines consolidate with larger airlines, including legacy carriers acquiring smaller regional airlines. In the leap from going regional to national, changed the concentration in the industry completely, which had positive spillover effects to rival airlines. In this evolution, airlines gained control of what grew to become the modern day hubs, where the larger, consolidated carriers ended up controlling the traffic between important city pairs. With airlines staying out of their competitors' hubs, airlines were in many cases left alone with a huge amount of power of crucial routes out of each of their specific airports, making them able to charge higher fares and avoid competition.

The test using the rival data of Singal (1996) used a larger sample featuring both takeovers and consolidations excluded by Knapp (1990) in the years 1985 to 1988, which made the abnormal returns slightly lower, but still positive and significant for more than half of the values. The relatively free merging market in the late 1980's saw transactions come away undisputed by authorities. This made some airlines stronger positioned through growth and efficiency gains. However, mergers did create spillover effects in the industry, and thus implying collusive pricing among competitors by increased power as competition weakened. The market power hypothesis is therefore supported by the results found in from using the same dataset as Knapp (1990), but also to a relatively high extent by the stock data featured in Singal (1996).

In the data from 1993 until 2013, the results start to have a tendency towards negative abnormal returns for the rival airlines. Looked at separately, the data before and after 9/11

show negative abnormal returns, in a total of 13 out of 14 event windows, and with nine of these being statistically significant.<sup>9</sup> However, if analyzed jointly, the number of observations increases and the test statistics are stronger and indicate a stronger power of the test with all  $J_1$  being significant. Generally speaking, there seems to be a tendency towards the gains of airlines being made more through operational synergies and thus strengthening of market position. With the growth of LCC's over the last decades, the traditional legacy carriers have had few options but to merge and try to create synergies through density or scale. While airlines in the 1980s' were less worried about cost savings, collusive pricing may have been an easier way of increased profits back then than today, where strict regulations and controlling organs define the rulebook of the industry.

Alongside the argument on the change of times through new regulations and stricter law enforcements, the change from positive to negative abnormal returns for rivals can be explained through the market situation. The later decades have seen fewer, but stronger players in the airline industry as consolidation of the past have made them of the size they are today. However, the type of merger activity seen in the 1980's remains a thing of the past, and the mergers of the last decades have rather been huge airlines acquiring other large players which find themselves in financial distress. This can be a reflection of a constantly tougher market, where the competition among legacy carriers are challenged by their longtime competitors having to improve as well as being able to restrain customers from flying the often profitable low cost carriers. Thus, the current players of the U.S. airline industry may be described as having a stronger market position today through their increased size and forced ability to push competition out of the market. However, this also makes the study decline the market power hypothesis for the most recent data, as there does not seem to be significant effects of collusive pricing represented in the data. Despite this, it would be naïve to believe that there does not exist at least some form of collusive behavior in the industry even though not observed in the data. The end result does also support Eckbo (1983) among others, that declined the market power hypothesis in the manufacturing industry and the belief that the antitrust laws and governments do stop mergers that may have collusive pricing as a result, as a preventive action.

<sup>&</sup>lt;sup>9</sup> See appendix 9 and 10 for detailed information.

## 7 DISCUSSION

The preceding 68 pages have consisted information about previous research, an overview of the airline industry and most importantly an event study of the stock effect on both the merging airlines and their rivals at the time of merger announcement. Unavoidable, the information presented and data given creates an overload of information. This can possibly make it difficult to extract the essence of the study, and understand which factors made the result turn out the way it did. The thesis will therefore be terminated with a discussion of the already presented material. The conclusion will give a precise verdict of the event study data, while the potential weaknesses will be illustrated next. Furthermore, a brief outlook on the M&A future of the airline industry will lead to a presentation of potential future research on the topic.

#### 7.1 CONCLUSION

This study finds evidence that both acquiring and target airlines achieve positive abnormal returns in the event of a M&A transaction announcement. The results from the tests performed are in line with existing research on the topic, with target airlines experience earning higher returns than the bidders, and the airlines being taken over achieving the greatest abnormal returns. While acquiring firms were expected to generate positive returns, these turned out to be slightly higher and with a higher degree of certainty than existing research presents. Summarized, the conclusion for the airlines involved in mergers and acquisitions are subject to earning positive abnormal returns upon announcement, over the thirty-year time span between 1985 to 2016.

With expectations being unclear for rival firms, the results also do reveal conflicting results. The market power has been accepted in previous research, and using only the 1986 data there are evidence supporting this. However, by including mergers in the years omitting 1986, as well as looking at data from the last couple of decades, the results shift from suggesting collusive pricing as a result of airline M&As, towards negative abnormal returns for the relevant rivals. At the same time, the number of negative abnormal returns in the datasets increases. By looking at the total of 365 rivals of merging airlines, the tests show slightly

negative abnormal returns with a significant overweight of the returns being negative. There is therefore evidence among the dataset rejecting the market power hypothesis, and rather explaining synergy gains through improved operational performance and merging specific advantages combined with a continuing strengthening of market position though size and density.

The evidence presented in this study illustrates an industry that have changed over the past three decades. From being a consortium of many airlines with a limited geographical footprint, it is today a much smaller number of influential airlines in the industry. Only three of the legacy carriers have survived though a number of consolidations, and is currently shifting business models to compete with the rising low cost carriers. The deregulation of the market stands as the single most important event in the industry, while other circumstances also have changed the rules of play to some degree. In general, the mergers between airlines during the horizon covered in this study seems to have been motivated by either survival as the primary motivational factor, or the exercise of market power, with elements of operational benefits and geographical reach also playing an important part. And even though there seems to have been mergers motivated by collusive pricing in the data, the hypothesis that this is descriptive for the industry is rejected.

### 7.2 WEAKNESSES

After having performed a comprehensive event study measuring abnormal returns for merging airlines at the time of the announcement, there are and should be some actions to be questioned and other lessons learned to be typed out. In the chapter regarding data processing, there is already a sub-chapter stressing the limitations regarding data sample, size and selection. To elaborate on the actual limitations, there should be mentioned two lessons learned. Number one is the importance of having clear boundaries of what data to collect or not. Initially, the study aimed at including stock data of all available airline mergers in the world from the mid 1980's until today (2017). This turned out to be unrealistic, and deciding upon only using U.S. data, and which airlines to eventually exclude and include was time consuming as it could have been more clear from the beginning where to set the boundaries. The second lesson is acknowledging the consequences of going through the collected data thoroughly. While downloaded from the trustworthy database CRSP, the data still was not

without flaws. This was experienced first-hand through test results that did not make sense, forcing the data to be searched from top to bottom in order to secure reliable results from the following tests.

Some of the decisions in the data selection may also be questioned. Starting with using the S&P 500 Composite Index as benchmark instead of an industry portfolio, this study deviates from work by e.g. Singal (1996). While the S&P may represent the market well, there is no doubt that an industry portfolio better would have eliminated the general industry-specific gains or losses on the stock price. However, due to reasons of simplicity, the S&P was favorable in this study. Not in particular related to selection of data, the constantly decreasing number of rivals in the rival portfolios does represent an issue, with the individual weight of each rival increasing throughout the horizon. While the number of rivals has decreased in the industry, lacking stock data from new competitors in the last decades made some of the rival portfolios smaller than desired. While there also may be questioning regarding low samples in some parts of the study, there simply does not exist any more available data. At the same time, this study consistently outperforms similar previous studies in regards to sample sizes.

Leading up to what might be part of future studies, drawing conclusions of market power solely based on stock market returns may only represent half of the truth. Singal (1996) makes it clear that one must look at both stock and airfares in order to paint the full picture of the existence of market power. This would however go beyond the scope and scale of this thesis, and have thus been excluded. Analyzing airfare data is becoming increasingly difficult, as one cannot measure prices as easily as in the past because of increasingly complicated algorithms making pricing more unpredictable than ever before by airlines. However, it does not say that it is not possible, and making average prices on key city pairs certainly is possible given enough time and access to necessary data.

#### 7.3 FUTURE EXPECTATIONS

Air traffic is expected to double over the span of the next 15 years. In line with the expected growth, a high number of new aircraft is expected to be delivered (Airbus, 2016). These will enter into service with both existing carriers, as well as future airlines which have yet to be founded. However, looking at the past of the industry, three things seem to be certain: Over

the next 15 years when the traffic is expected to double, bankruptcies will happen, airlines will merge and new players will enter the market. Which airlines that are going to experience these scenarios remain uncertain, but the birth and continuing growth of low cost carriers into new regions is a natural assumption, using the expansion of Norwegian and Air Asia as proxies on the worldwide basis. In the U.S. market, the ultra-low cost carriers (ULCC) have disrupted the market position of legacy carriers, forcing them to change the bundling of fares in order to compete in an increasing number of markets (Airbus, 2016). Although, being able to serve a large enough customer base might see some of these ULCCs consolidate in order to strengthen their presence and profitability.

Among the value-airlines previously mentioned, the acquisition of Virgin America by Alaska Airlines was motivated by exploiting weakly covered markets, in addition to include a money-making business into Alaska's already profitable operations. To illustrate this, the merger enabled Alaska to deploy regional jets in Virgin America's market to serve thinner routes from San Francisco and thus better be able to compete with a legacy carrier, and market leader (The Motley Fool, 2016). Similar scenarios seem likely in order for the U.S. value airlines to gain synergy effects and thus remain profitable also in the long run, and not just in limited a time of volatile fuel prices or other unexpected events.

In line with the trend from the past decades, the number of M&A transactions outside the U.S. have been rather low. Instead of pure mergers, we have seen purchases by e.g. the Lufthansa Group of majority stakes in other European carriers. On the other side, Middle Eastern giant Etihad Airways have presented another angle of consolidation through buying minority stakes (49 percent and less) in struggling, semi-large airlines primarily in Europe to feed the passengers of those airlines into their own network, and thus create their own alliance (The Economist, 2014). This approach is so far only attempted by Etihad, but represent yet another way of gaining synergies through consolidation, without either merge or join an alliance, and represent a potential new path for airlines to remain profitable.

#### 7.4 FUTURE RESEARCH

The possibilities of future research in the area of analyzing the performance of airline mergers and acquisitions are substantial. Primarily, with mergers continuing to happen

throughout the airline industry, the scope of available data will increase at time passes. This will make future studies able to test the American industry further, to determine whether there still are expected abnormal returns for merging airlines, or if the market power hypothesis still is to be declined. Maybe more importantly, an increase of future mergers on a worldwide basis will make industry analyses outside the U.S. more likely. While being hard to analyze one specific country, there could potentially be tested the differences between the airline industry in the U.S. and the rest of the world. Additionally, with an increased number of available airline mergers, one could divide the data into a larger amount of sub-groups. Examples of this could be to separate legacy carriers from low cost carriers or to look at takeovers versus consolidations also for bidder airlines and not just for the target airlines.

Furthermore, another possible study is to substitute the benchmark index of this study with a value-weighted industry portfolio. One such study could describe just how much difference it makes to use a broad, market portfolio in comparison to an industry-specific market portfolio when performing the regressions measuring the normal performance of the stocks. Other horizons for the estimation window could also be applied, to check whether it is important to include a full year in determining normal performance, or if the common rule of around 100 trading days are sufficient. Finally, despite being eliminated out of non-benefiting complexity reasons, economic models like the APT and CAPM could be applied to the dataset when determining the normal performance to see what difference the choice of model has to an event study of this extent.

The final, but maybe most relevant factor of achieving evidence of future studies, is to include airfares in the equation. Singal (1996) has already used airfares and stock returns jointly, but referring to the underlying motivation for this study, his data only omits the years 1985 to 1988 and represent a completely different industry situation. Described in the previous sub-chapter as a complex process, it is still manageable and would be a natural progression from this study. The use of airfares does have the benefit of actually tracking whether prices increase or not on specific routes or city pairs when airlines merge together, and thus give a better illustration of whether the change in competition has effected the end customer positive or negative. Combining this with knowledge from an event stock analysis is currently what have the best explanatory power of the presence of market power in relation to airline mergers and acquisitions.

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### Data Source

CRSP Daily Data, Wharton Research Data Services, Wharton University of Pennsylvania.

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## APPENDIX 1 – Bidder airlines

Acquired - acquirer	Announcement date
Mississippi Valley Airlines - Air Wisconsin	January 30, 1985
Muse Air - Southwest Airlines	March 11, 1985
Frontier Airlines - People Express Airlines	September 20, 1985
Empire Airlines - Piedmont Airlines	September 26, 1985
Provincetown-Boston Airlines - People Express Airlines	February 3, 1986
Eastern Air Lines - Texas Int'l Airlines	February 24, 1986
Ozark Air Lines - Trans World Airlines	February 28, 1986
People Express Airlines - Texas Int'l Airlines	July 3, 1986
Jet America Airlines - Alaska Airlines	August 7, 1986
Western Airlines - Delta Air Lines	September 10, 1986
AirCal - American Airlines	November 18, 1986
Horizon Air - Alaska Airlines	November 20, 1986
Florida Express - Braniff International Airlines	October 23, 1987
Wings West Airlines - American Airlines	April 19, 1988
Command Airways - American Airlines	June 14, 1988
Simmons Airlines - American Airlines	June 21, 1988
Morris Airlines - Southwest Airlines	December 13, 1993
AirTan Airways (Airways Corp.) - ValuJet Airlines	July 11, 1997
Reno Air - American Airlines	November 19, 1998
Atlantic Southeast Airlines - Delta Air Lines	February 16, 1999
Comair - Delta Air Lines	October 18, 1999
Trans World Airlines - American Airlines	January 10, 2001
Shuttle America - Republic Airways	April 22, 2005
US Airways - America West Airlines	May 19, 2005
Atlantic Southeast Airlines - SkyWest	August 15, 2005
Colgan Air - Pinnacle Airlines	January 18, 2007
ATA Airlines - Southwest Airlines	November 19, 2008
Northwest Airlines - Delta Air Lines	April 14, 2008
Midwest Airlines - Republic Airways	June 23, 2009
Frontier Airlines - Republic Airways	August 14, 2009
United Airlines - Continental Airlines	May 3, 2010
Mesaba Airlines - Pinnacle Airlines	July 1, 2010
ExpressJet Airlines - SkyWest Atlantic Southeast	August 4, 2010
AirTran Airways - Southwest Airlines	September 27, 2010
American Airlines - US Airways	February 14, 2013
Virgin America - Alaska Airlines	April 4, 2016

# APPENDIX 2 – Target airlines

Acquired - acquirer	Announcement date
Mississippi Valley Airlines - Air Wisconsin	January 30, 1985
Muse Air - Southwest Airlines	March 11, 1985
Frontier Airlines - People Express Airlines	September 20, 1985
Empire Airlines - Piedmont Airlines	September 26, 1985
Republic Airways - Northwest Airlines	January 24, 1986
Provincetown-Boston Airlines - People Express Airlines	February 3, 1986
Eastern Air Lines - Texas Int'l Airlines	February 24, 1986
Ozark Air Lines - Trans World Airlines	February 28, 1986
People Express Airlines - Texas Int'l Airlines	July 3, 1986
Jet America Airlines - Alaska Airlines	August 7, 1986
Western Airlines - Delta Air Lines	September 10, 1986
AirCal - American Airlines	November 18, 1986
Horizon Air - Alaska Airlines	November 20, 1986
Pacific Southwest Airlines - US Air	December 9, 1986
Piedmont Airlines - US Air	January 28, 1987
Florida Express - Braniff Int'l Airlines	October 23, 1987
Wings West Airlines - American Airlines	April 19, 1988
Command Airways - American Airlines	June 14, 1988
Simmons Airlines - American Airlines	June 21, 1988
AirTan Airways (Airways Corp.) - ValuJet Airlines	July 11, 1997
Reno Air - American Airlines (AMR)	November 19, 1998
Comair - Delta Air Lines	October 18, 1999
Northwest Airlines - Delta Air Lines	April 14, 2008
ExpressJet Airlines - SkyWest Atlantic Southeast	August 4, 2010
AirTran Airways - Southwest Airlines	September 27, 2010
Virgin America - Alaska Airlines	April 4, 2016

Takeover	Announcement date
Mississippi Valley Airlines	January 30, 1985
Empire Airlines	September 26, 1985
Provincetown-Boston Airlines	February 3, 1986
Jet America Airlines	August 7, 1986
Western Airlines	September 10, 1986
AirCal	November 18, 1986
Pacific Southwest Airlines	December 9, 1986
Wings West Airlines	April 19, 1988
Command Airlines	June 14, 1988
Simmons Airlines	June 21, 1988
Florida Express	October 23, 1987
Reno Air	November 19, 1998
Comair	October 18, 1999
Concolidation	Announcement date
	Marah 11, 1095
Muse All	Match 11, 1965
Eroption Airlings	Sontombor 20, 1085
Frontier Airlines	September 20, 1985
Frontier Airlines Republic Airways	September 20, 1985 January 24, 1986
Frontier Airlines Republic Airways Eastern Air Lines	September 20, 1985 January 24, 1986 February 24, 1986
Frontier Airlines Republic Airways Eastern Air Lines Ozark Air Lines People Express Airlines	September 20, 1985 January 24, 1986 February 24, 1986 February 28, 1986
Frontier Airlines Republic Airways Eastern Air Lines Ozark Air Lines People Express Airlines Horizon Air	September 20, 1985 January 24, 1986 February 24, 1986 February 28, 1986 July 3, 1986 November 20, 1986
Frontier Airlines Republic Airways Eastern Air Lines Ozark Air Lines People Express Airlines Horizon Air Piedmont	September 20, 1985 January 24, 1986 February 24, 1986 February 28, 1986 July 3, 1986 November 20, 1986 January 28, 1987
Frontier Airlines Republic Airways Eastern Air Lines Ozark Air Lines People Express Airlines Horizon Air Piedmont AirTran Airways (Airways Corp.)	September 20, 1985 January 24, 1986 February 24, 1986 February 28, 1986 July 3, 1986 November 20, 1986 January 28, 1987 July 11, 1997
Frontier Airlines Republic Airways Eastern Air Lines Ozark Air Lines People Express Airlines Horizon Air Piedmont AirTran Airways (Airways Corp.) Northwest Airlines	September 20, 1985 January 24, 1986 February 24, 1986 February 28, 1986 July 3, 1986 November 20, 1986 January 28, 1987 July 11, 1997 April 14, 2008
Frontier Airlines Republic Airways Eastern Air Lines Ozark Air Lines People Express Airlines Horizon Air Piedmont AirTran Airways (Airways Corp.) Northwest Airlines Express let Airlines	September 20, 1985 January 24, 1986 February 24, 1986 February 28, 1986 July 3, 1986 November 20, 1986 January 28, 1987 July 11, 1997 April 14, 2008 August 4, 2010
Frontier Airlines Republic Airways Eastern Air Lines Ozark Air Lines People Express Airlines Horizon Air Piedmont AirTran Airways (Airways Corp.) Northwest Airlines ExpressJet Airlines AirTran Airways	September 20, 1985 January 24, 1986 February 24, 1986 February 28, 1986 July 3, 1986 November 20, 1986 January 28, 1987 July 11, 1997 April 14, 2008 August 4, 2010 September 27, 2010

## APPENDIX 3 – Takeover and consolidation

# APPENDIX 4 – All merging airlines

Acquired - acquirer	Announcement date
Mississippi Valley Airlines - Air Wisconsin	January 30, 1985
Muse Air - Southwest Airlines	March 11, 1985
Frontier Airlines - People Express Airlines	September 20, 1985
Empire Airlines - Piedmont Airlines	September 26, 1985
Republic Airways - Northwest Airlines	January 24, 1986
Provincetown-Boston Airlines - People Express Airlines	February 3, 1986
Eastern Air Lines - Texas Int'l Airlines	February 24, 1986
<b>Ozark Air Lines - Trans World Airlines</b>	February 28, 1986
People Express Airlines - Texas Int'l Airlines	July 3, 1986
Jet America Airlines - Alaska Airlines	August 7, 1986
Western Airlines - Delta Air Lines	September 10, 1986
AirCal - American Airlines	November 18, 1986
Horizon Air - Alaska Airlines	November 20, 1986
Pacific Southwest Airlines - US Air	December 9, 1986
Piedmont Airlines - US Air	January 28, 1987
Florida Express - Braniff Int'l Airlines	October 23, 1987
Wings West Airlines - American Airlines	April 19, 1988
<b>Command Airways - American Airlines</b>	June 14, 1988
Simmons Airlines - American Airlines	June 21, 1988
Morris Airlines - Southwest Airlines	December 13, 1993
AirTan Airways (Airways Corp.) - ValuJet Airlines	July 11, 1997
Reno Air - American Airlines	November 19, 1998
Atlantic Southeast Airlines - Delta Air Lines	February 16, 1999
Comair - Delta Air Lines	October 18, 1999
Trans World Airlines - American Airlines	January 10, 2001
Shuttle America - Republic Airways	April 22, 2005
US Airways - America West Airlines	May 19, 2005
Atlantic Southeast Airlines - SkyWest	August 15, 2005
Colgan Air - Pinnacle Airlines	January 18, 2007
ATA Airlines - Southwest Airlines	November 19, 2008
Northwest Airlines - Delta Air Lines	April 14, 2008
Midwest Airlines - Republic Airways	June 23, 2009
Frontier Airlines - Republic Airways	August 14, 2009
United Airlines - Continental Airlines	May 3, 2010
Mesaba Airlines - Pinnacle Airlines	July 1, 2010
ExpressJet Airlines - SkyWest Atlantic Southeast	August 4, 2010
AirTran Airways - Southwest Airlines	September 27, 2010
American Airlines - US Airways	February 14, 2013
Virgin America - Alaska Airlines	April 4, 2016

	Merger	Announcement date
<del>, _</del>	Republic Airways - Northwest Airlines	January 24, 1986
$\sim$	Eastern Air Lines - Texas Int'l Airlines	February 24, 1986
$\mathbf{c}$	<b>Ozark Air Lines - Trans World Airlines</b>	February 28, 1986
<del>. +</del>	People Express Airlines - Texas Int'l Airlines	July 3, 1986
10	Jet America Airlines - Alaska Airlines	August 7, 1986
Ś	Western Airlines - Delta Air Lines	September 10, 1986
	AirCal - American Airlines	November 18, 1986
$\infty$	Horizon Air - Alaska Airlines	November 20, 1986
6	Pacific Southwest Airlines - US Air	December 9, 1986

# kivals

United, Eastern, American, Western, Delta, Alaska, Ozark, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America

United, Eastern, American, Northwest, Western, Delta, Alaska, Republic, Southwest, Texas, Piedmont, Aloha, Continental & Jet America United, American, Northwest, Western, Delta, Alaska, Ozark, Republic, Southwest, Piedmont, Aloha, TWA, Continental & Jet America

United, Eastern, American, Northwest, Western, Delta, Alaska, Republic, Southwest, Piedmont, Aloha, TWA, Continental & Jet America - 2 6 4 5 9 7 8 6

United, Eastern, American, Northwest, Western, Delta, Ozark, Republic, Southwest, Texas, Piedmont, Aloha, TWA & Continental United, Eastern, American, Northwest, Alaska, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America.

United, Eastern, Northwest, Western, Delta, Alaska, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America

United, American, Northwest, Western, Delta, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America

United, American, Northwest, Western, Delta, Alaska, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America

# APPENDIX 6 – Singal rivals

	Merger	Announcement date
1	Muse Air - Southwest Airlines	March 11, 1985
2	Frontier Airlines - People Express Airlines	September 20, 1985
3	Empire Airlines - Piedmont Airlines	September 26, 1985
4	Republic Airways - Northwest Airlines	January 24, 1986
5	Eastern Air Lines - Texas Int'l Airlines	February 24, 1986
6	Ozark Air Lines - Trans World Airlines	February 28, 1986
7	People Express Airlines - Texas Int'l Airlines	July 3, 1986
8	Jet America Airlines - Alaska Airlines	August 7, 1986
9	Western Airlines - Delta Air Lines	September 10, 1986
10	AirCal - American Airlines	November 18, 1986
11	Horizon Air - Alaska Airlines	November 20, 1986
12	Pacific Southwest Airlines - US Air	December 9, 1986
13	Piedmont - US Air	January 28, 1987
14	Florida Express - Braniff Int'l Airlines	October 23, 1987
15	Mississippi Valley Airlines - Air Wisconsin	January 30, 1985
16	Provincetown-Boston Airlines - People Express Airlines	February 3, 1986
17	Wings West Airlines - American Airlines	April 19, 1988
18	Command Airways - American Airlines	June 14, 1988
19	Simmons Airlines - American Airlines	June 21, 1988

	Rivals
1	United, Eastern, American, Northwest, Western, Delta, Alaska, Ozark, Republic, Texas, Piedmont, Aloha, TWA, Continental & Jet America
ы	United, Eastern, American, Northwest, Western, Delta, Alaska, Ozark, Republic, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America
ω	United, Eastern, American, Northwest, Western, Delta, Alaska, Ozark, Republic, Southwest, Texas, Aloha, TWA, Continental & Jet America
4	United, Eastern, American, Western, Delta, Alaska, Ozark, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America
S	United, American, Northwest, Western, Delta, Alaska, Ozark, Republic, Southwest, Piedmont, Aloha, TWA, Continental & Jet America
9	United, Eastern, American, Northwest, Western, Delta, Alaska, Republic, Southwest, Texas, Piedmont, Aloha, Continental & Jet America
٢	United, Eastern, American, Northwest, Western, Delta, Alaska, Republic, Southwest, Piedmont, Aloha, TWA, Continental & Jet America
$\infty$	United, Eastern, American, Northwest, Western, Delta, Ozark, Republic, Southwest, Texas, Piedmont, Aloha, TWA & Continental
6	United, Eastern, American, Northwest, Alaska, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America.
10	United, Eastern, Northwest, Western, Delta, Alaska, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America
11	United, American, Northwest, Western, Delta, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America
12	United, American, Northwest, Western, Delta, Alaska, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America
13	United, American, Northwest, Delta, Alaska, Southwest, Texas, TWA & Continental
14	United, American, Northwest, Delta, Alaska, Southwest, Texas, Piedmont & TWA
15	United, Eastern, American, Northwest, Western, Delta, Alaska, Ozark, Republic, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America
16	United, Eastern, American, Northwest, Western, Delta, Alaska, Ozark, Republic, Southwest, Texas, Piedmont, Aloha, TWA, Continental & Jet America

- United, Dastern, Anterican, Fouriess, Western, Dena, Alaska, 17 United, Northwest, Delta, Alaska, Southwest, Texas & TWA
  United, Northwest, Delta, Alaska, Southwest, Texas & TWA
  United, Northwest, Delta, Alaska, Southwest, Texas & TWA

#### APPENDIX 7 – New data

	Merger	Announcement date
1	Morris Airlines - Southwest Airlines	December 13, 1993
2	AirTan Airways (Airways Corp.) - ValuJet Airlines	July 11, 1997
3	Reno Air - American Airlines (AMR)	November 19, 1998
4	Atlantic Southeast Airlines - Delta Air Lines	February 16, 1999
5	Comair - Delta Air Lines	October 18, 1999
6	Trans World Airlines - American Airlines	January 10, 2001
7	Shuttle America - Republic Airways	April 22, 2005
8	US Airways - America West Airlines	May 19, 2005
9	Atlantic Southeast Airlines - SkyWest	August 15, 2005
10	Colgan Air - Pinnacle Airlines Colgan	January 18, 2007
11	ATA Airlines - Southwest Airlines	November 19, 2008
12	Northwest Airlines - Delta Air Lines	April 14, 2008
13	Midwest Airlines - Republic Airways	June 23, 2009
14	Frontier Airlines - Republic Airways	August 14, 2009
15	United Airlines - Continental Airlines	May 3, 2010
16	Mesaba Airlines - Pinnacle Airlines	July 1, 2010
17	ExpressJet Airlines - SkyWest Atlantic Southeast	August 4, 2010
18	AirTran Airways - Southwest Airlines	September 27, 2010
19	American Airlines - US Airways	February 14, 2013

#### Rivals

- 1 United, American, Delta, Alaska, US Air
- 2 United, American, Delta, Alaska, US Air, Southwest, Continental, Northwest, America West & TWA
- 3 United, Delta, Alaska, US Air, Southwest, Continental, Northwest, America West & TWA
- 4 United, American, Alaska, US Air, Southwest, Continental, Northwest, America West & TWA
- 5 United, American, Alaska, US Air, Southwest, Continental, Northwest, America West & TWA
- 6 United, Delta, Alaska, US Air, Southwest, Continental, Northwest & America West
- 7 American, Delta, Alaska, Continental, Northwest, America West & JetBlue
- 8 American, Delta, Alaska, Continental, Northwest & JetBlue
- 9 American, Delta, Alaska, Continental, Northwest, America West & JetBlue
- 10 American, Alaska, Continental, JetBlue & US Air
- 11 American, Delta, Alaska, Continental, JetBlue & US Air
- 12 American, Alaska, Southwest, Continental, JetBlue & US Air
- 13 American, Alaska, Southwest, Continental, JetBlue, US Air & Delta
- 14 American, Alaska, Southwest, Continental, JetBlue, US Air & Delta
- 15 American, Alaska, Southwest, JetBlue, US Air & Delta
- 16 American, Alaska, Southwest, Continental, JetBlue, US Air & Delta
- 17 American, Alaska, Southwest, Continental, JetBlue, US Air & Delta
- 18 American, Alaska, JetBlue, US Air, United, Delta
- 19 Alaska, Southwest, JetBlue, United, Delta

<b>Event window</b>	Abnormal returns	Normal return	$J_1$	$N^{-}$	$\widehat{\pi}$	$J_3$
[-20, 10]	0.023	0.008	1.57	52	0.456	-0.94
[-20, 0]	0.012	-0.003	1.03	55	0.482	-0.37
[0, 10]	0.012	0.011	1.43	58	0.509	0.19
[-10, 5]	0.007	-0.003	0.68	60	0.526	0.56
[-3, 3]	-0.016	0.005	2.46	66	0.579	1.69
[-1, 1]	-0.006	-0.001	1.40	61	0.535	0.75
[0, 0]	0.001	0.001	0.47	51	0.447	-1.12

APPENDIX 8 – Test of data, Singal excluding Knapp. N = 114

APPENDIX 9 – Test of rivals between 1993 and 2001 (pre 9/11). N = 50

Event window	Abnormal returns	Normal return	$J_1$	$N^{-}$	$\widehat{\pi}$	$J_3$
[-20, 10]	-0.090	-0.036	1.68	21	0.420	-1.13
[-20, 0]	-0.033	-0.036	0.76	22	0.440	-0.85
[0, 10]	-0.070	0.004	2.26	29	0.580	1.13
[-10, 5]	-0.038	-0.015	0.98	22	0.440	-0.85
[-3, 3]	-0.096	-0.003	3.94	31	0.620	1.70
[-1, 1]	-0.055	-0.007	3.48	31	0.620	1.70
[0, 0]	-0.013	0.004	1.39	37	0.740	3.39

APPENDIX 10 – Test of rivals between 2005 and 2013. N = 82

<b>Event window</b>	Abnormal returns	Normal return	$J_1$	$N^{-}$	$\widehat{\pi}$	$J_3$
[-20, 10]	-0.026	0.065	0.97	42	0.512	0.22
[-20, 0]	-0.042	0.042	1.98	54	0.659	2.87
[0, 10]	0.002	0.017	0.13	40	0.488	-0.22
[-10, 5]	-0.048	0.015	2.53	56	0.683	3.31
[-3, 3]	-0.033	0.003	2.70	59	0.720	3.98
[-1, 1]	-0.017	-0.017	2.13	55	0.671	3.09
[0, 0]	-0.015	-0.006	3.23	55	0.671	3.09



APPENDIX 11 – Graphical interpretation of appendices 9 and 10