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An investigation of Financial distress, Economic distress and State aid

The European Airline Industry 2000-2005

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Abstract

Almost half of the members of the European Airline Association, 14 airlines, experienced financial distress at some point between 2000 and 2005. Among these financially distressed airlines, 79 percent were in economic distress at least once in the same time period. The correlation between financial and economic distress is statistically significant at the 5% level. Out of the 14 companies in financial distress 7 received state aid. Whereas the limited sample size prevents results to be strongly statistically significant, we find that airlines that received state aid on average showed lower operating result/revenue in all years, prior as well as subsequent to the state aid. The economic significance of the results is strong, with the state aid group reporting operating losses of up to 6% of revenue, and the no state aid group reporting operating profits in the same order of magnitude. Moreover, the annual percentage point improvement in operating result/revenue was lower for the group of airlines that received state aid. The correlation between economic distress and state aid is strongly statistically significant. Our study cannot establish a relationship between unemployment levels and state aid, however our findings suggest that airlines having their headquarters in countries where investor protection rights are low were more likely to receive state aid. This suggests that state aid, while targeting operatively inefficient companies, is given more frequently in countries where it is, from a theoretical general equilibrium perspective, more likely to be efficient than it would be in the other countries. An alternative explanation to the result could be that airlines involve in regulatory capturing.

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1. Introduction

Since the year 2000, airlines all over the world have experienced financial difficulties to an extent that has no comparison in the history of the airline business.¹ In 2001 the total operating result for the members of the Association of European Airlines (AEA)² was a loss of USD 3.02 billion; the worst result ever reported.³ Airline crisis is not a new phenomenon. The reason why the latest crisis is the largest in history is that several factors have worked jointly in a negative direction. First of all, the stepwise deregulation of the European airline industry culminating in 1993⁴ and thus the entry of low-cost carriers has increased competition, and hence reduced prices and shrunk margins. Second, the terror attack of 9/11, the SARS epidemic and the Iraq war have severely decreased the amount of travelling. Third, the recession in the economy has had a negative impact on the number of business passengers.⁵ In this paper we investigate the severity of the latest airline crisis. More precisely, the purpose of our study is to answer the following questions:

1. Have European airlines been financially distressed 2000-2005?
2. Have the airlines also been economically distressed over the same period?
3. Which of the airlines that were in financial distress were granted state aid?
4. Which group of airlines, the one receiving state aid or the one not receiving state aid, had a better operating performance and performance improvement?
5. Are there any differences in unemployment rates and investor protection rights between the countries that granted state aid and the countries that did not?

A considerable amount of research has been done on the subject of ailing airlines. Baird (1990) studies the chapter 11 filing of Eastern Airlines, Borenstein and Rose (1995a) examine whether airlines in chapter 11 harm their rivals, Borenstein and Rose (1995b) investigate bankruptcy and pricing in the US airline market, and Pulvino (1998) studies asset fire sales in the airline industry. However, to the knowledge of

¹ Littorin (2006), interview; Doganis (2005) p.17-18

² Members include European legacy carriers and a few other important European carriers. AEA had 31 member airlines 2000-2005.

³ AEA yearbook 2002, p.2

⁴ Frenken (2003) p.233-234

⁵ Doganis (2005) p.1-2

the authors, there is no previous study investigating financial distress⁶ and economic distress⁷ among European airlines. Nor is there a study examining whether state aid has been given to European airlines in financial distress, and whether the performance differs between these airlines and the ones not granted state aid.

Our paper contributes to shedding light on these issues. We first investigate which European legacy carriers have been in financial distress during the period January 2000 to December 2005. Secondly, we examine which airlines have been in economic distress during the same period. Thirdly, we study which of the financially distressed airlines received state aid and which did not, and we compare the operating performance of the two groups. Finally, we examine, based on unemployment rates and investor protection rights, if state aid has been more likely to be granted in countries with high/low unemployment rate or high/low investor protection rights.

We use six proxies for financial distress, of which a majority follows previous literature. The proxies are: 1) Stock price performance (*Gilson, John and Lang (1990)*), 2) EBITDA/interest expense (*Asquith, Gertner & Scharfstein (1994)* and *Andrade and Kaplan (1998)*), 3) Actual bankruptcy, 4) Debt restructuring as a response to bankruptcy threat (*Andrade and Kaplan (1998)*), 5) Default on debt (*Andrade and Kaplan (1998)*), and 6) State aid as a response to bankruptcy threat. In order to detect state aid, we perform Factiva and Business Source Premier searches. For economic distress, we use the following two proxies: 1) Negative operating results when adjusted for implied interests from operating leases, and 2) Positive operating results, but negative net income, and a position in the lowest 10 percent of the distribution of the operating result/revenue or net income/revenue for all AEA-airlines in a selected base year. To investigate whether airlines that received state aid or airlines that did not receive state aid performed better, we collect income statement data from the annual reports and analyze it. Having done this, we collect data on unemployment rates and investor protection rights of all countries where the financially distressed airlines have their headquarters in order to see if there are any differences in respect to these measures between the countries that granted state aid to their ailing airlines and the countries that did not.

⁶ Non-ability to service debt

⁷ Non-ability to cover operating expenses with operating income

Our main findings are the following:

1. 14 out of the 28 investigated European airlines were in financial distress at some point between January 2000 and December 2005.
2. 11 of the 14 airlines that were in financial distress were also in economic distress at some point, and 74% of the indices of financial distress were accompanied by economic distress. The correlation between financial distress and economic distress is significant at the 5% level in each year separately as well as over the total time period.
3. Alitalia, Olympic Airlines, Cyprus Airways, Malev, Air Malta, Swiss⁸ and Sabena⁹ were all granted state aid at least once during the six-year period.
4. The operating performance was worse in terms of averages and medians for the group that received state aid. However not strongly statistically significant due to the small sample size, the economic difference between the results of the two groups is large. While the group that was granted state aid reported an average operating loss of 3.2% of revenues over the period the group that did not receive state aid reported an average operating profit of 3.5% of revenues. Also, state aid and economic distress are positively correlated at the 5% level in 2003, 2004 and 2005 as well as for the overall period.
5. There is no significant difference, neither statistical nor economic, in unemployment levels between the countries that granted state aid and the ones that did not. However, countries with lower investor protection rights were more inclined to grant state aid to their legacy carriers. Due to the small sample size, the relationship is not strongly statistically significant.

The rest of the study is structured in the following way: Section two gives a thorough background to the latest crisis within the airline industry. The subsequent sections investigate our five questions. First, we investigate whether the airlines have been in financial distress. Second, we study whether they have been in economic distress. Thereafter, the last three questions, concerning state aid, are investigated in a separate section. In the last part of the thesis, we use the findings from the three sections to answer our questions and conclude.

⁸ For clarity reasons the name Swiss is used for Swiss as well as Swissair in our study, even though the company operated under both names during the period.

⁹ For clarity reasons the name Sabena is used for Sabena as well as SN Brussels Airlines in our study, even though the company operated under both names during the period.

2. Overview of the airline industry 2000-2005

2.1 The global airline industry

The airline industry is cyclical in its nature, and it often faces five to six good years, followed by three to four bad years. The cycles are linked to the world economic performance, however sometimes with a lag. The global airline industry experienced a period of losses between 1990 and 1993, followed by a period of improving results. The period between 1997 and 1999 was one of the best in history for many airlines. In 2000 a new period of decline was initiated. That year, the industry as a whole was profitable, but during the following years, the global airline industry has experienced a downturn that has no comparison in history.¹⁰

The reason for the severity of the latest crisis is that the downturn in the world economy coincided with several other events that have influenced the industry in a negative direction. The drastic decrease in travelling following September 11, the SARS epidemic and the Iraq war have severely reduced revenues for the airlines. In addition, the stock market collapse of 2000 resulted in decreased business travelling, and hence lower revenues. Simultaneously as these external factors have reduced the number of passengers, the liberalisation of the European airline industry has increased competition from low-cost carriers and reduced the revenue per carried passenger kilometre. Moreover, oil price hikes have increased the operating costs of the airlines. Other factors, such as privatisation of state-owned carriers and increased online selling have also impacted the industry.¹¹

The harshening conditions have considerably increased the pressure on the airlines to streamline their organizations and reorganize to increase operational efficiency. One of the central areas of improvement is the labour cost, since it is the single largest component that the management can control. Thus differences in wages and labour productivity have a key influence in differentiating operating costs between airlines.¹²

¹⁰ Doganis (2005) p.1, 17-18

¹¹ Ibid p.12-15

¹² Ibid p.24

2.2 The European airline industry

The substantial losses reported by the European airline industry over the past six years have been influenced by the very same factors as the global airline industry as a whole. Below is a description of the joint economic results reported by the members of the Association of European Airlines (AEA) 2000-2005. AEA is the largest airline organisation in Europe, including European national legacy carriers, as well as few other important European carriers. The organization has existed for over 50 years and comprised 2000-2005 of 31 of the major European airlines¹³. Membership in AEA is not compulsory, and AEA has stated the following membership criteria:

*A new member of the AEA shall be registered in, licensed by, and with principal place of business in an eligible European country, as listed in the AEA statutes. A new member should have been engaged in passenger or cargo air transport operations in the last three years. Membership is open to all airlines: international, domestic, scheduled and charter passenger operators and all-cargo operators. The size of a member's operations shall be significant. When determining size of operations a number of criteria can be used but one guiding factor is number of aircraft seats operated, which shall be of the order of 3,000 minimum or for all-cargo operators a minimum payload of approximately 500 metric tonnes. If such criteria are not met by the major airline in a country, exemption from the above is possible. New membership is subject to acceptance by the AEA Assembly of Presidents.*¹⁴

In 2000, the AEA members reported a modest joint profit of USD 100 million. This was better than the loss of 424 million reported in 1999, but much worse than the profit of USD 2426 million in 1998. In 2000, some of the larger airlines reported gains; however the majority of the AEA members made losses. On average, AEA member airlines kept 20 cents as profit for every hundred dollar of revenues.¹⁵

In the following year, 2001, the airline crisis had become severe in Europe. Sabena defaulted in 2001 and Swiss in early 2002. Almost all other airlines reported losses for 2001, and the total operating result for the AEA airlines in 2001 was the worst

¹³ http://www.aea.be/AEAWebsite/Presentation_Tier/Pr_AboutUs.aspx

¹⁴ AEA Yearbook 2002, p.43

¹⁵ AEA yearbook 2001, p.2-3

ever reported: a loss of USD 3.02 billion. The downturn started in 2000 and was substantially worsened by the crisis following September 11. For AEA airlines, the North Atlantic route accounted for more than 20% of total revenue. Total AEA member revenues decreased by 7.1 % in 2001 compared to 2000. Following September 11, American airlines were compensated for their losses by the US government. They received compensation for the period when the US airspace was closed, as well as for losses during the rest of the year. The total amount paid to the airlines was USD 5 billion in cash and USD 10 billion in state guarantees on loans. In Europe however, the airlines were only compensated for the 4-day closure of the US airspace. Managers of European airlines found the situation unfair, and claimed that the more generous treatment of the US airlines led to competitive distortion.¹⁶

For 2002 the AEA member airlines reported a joint loss of USD 0.87 billion. Even though the hard period continued for the airlines, AEA reported that: *The continued crisis however, has been a catalyst for change and it has energised us to develop new solutions to meet the changing needs of our customer and the marketplace. AEA member airlines have reduced their overall costs of operations and many are re-evaluating core elements of their current business model addressing structural inefficiencies, particularly in the short haul sector.*¹⁷

The European airline industry was expected to recover in 2003 from the downturn following 9/11 2001, that continued to affect the business negatively during 2002. However, after the SARS epidemic and the Iraq war, the AEA airlines reported joint losses of USD 1.48 billion in 2003.¹⁸ Also in the following year, 2004, the business performed worse than expected, largely due to the soaring oil price, which increased 26 % compared to 2003.¹⁹ For 2004 a profit of USD 417 million was reported. However this result was judged as marginal based on the fact that the worldwide economic performance was the best since 1976, with a growth rate of 5.1 %.²⁰ In 2005 the AEA airlines reported a profit for the second year in a row. The aggregate result of the member airlines was USD 755 million. Even though the result was better

¹⁶ AEA yearbook 2002, p.2,4-5

¹⁷ AEA yearbook 2003, Introduction

¹⁸ AEA yearbook 2004, p.3

¹⁹ AEA yearbook 2004, p.4

²⁰ AEA Yearbook 2005, p.2

than the previous year, it was regarded as unsatisfactory, given that demand was strong, the economic growth was good, and the interest rates low.²¹

3. Financial distress

3.1 Data

The initial selection of airlines for our study is made based on membership in AEA. Once every twelve month AEA publishes the AEA yearbook. To avoid survivorship bias, all airlines that are stated as members in any of the yearbooks from 2000 to 2005 are included in this paper. The first selection includes the airlines in the table below.

AEA member airlines 2000-2005

Aer Lingus	Czech Airlines	Meridiana
Air France	Finnair	Olympic Airlines
Air France-KLM	Iberia	SAS
Air Malta	Icelandair	SN Brussels Airlines / Sabena
Alitalia	Jat Airways	Spanair
Austrian	KLM	Swiss / Swissair
BMI	LOT	TAP Portugal
British Airways	Lufthansa	TAROM
Cargolux	Luxair	Turkish Airlines
Croatia Airlines	Malev	Virgin Atlantic Airways
Cyprus Airways		

Table 1. AEA member airlines 2000-2005.

For various reasons, three airlines are then excluded:

1. *Cargolux* due to the fact that its operations are entirely focused on cargo, and that it would hence not be comparable with the other airlines.²²
2. *Spanair* due to its subsidiary status.²³
3. *Virgin Atlantic Airways* because it almost exclusively serves non-European destinations.²⁴

This gives a list of 28 airlines, on which the methods described in the section below are applied to examine whether they were in financial distress.

²¹ AEA yearbook 2006, p.8

²² <http://www.cargolux.com/company/presentation.php>

²³ AEA Yearbook 2005, p.50

²⁴ AEA Yearbook 2005, p.55

3.2 Method

As seen in the background section, the whole airline industry has experienced financial difficulties over the past few years. In order to find out which of the airlines have been in financial distress six different proxies are used, all stated in table 2. The reason why the last of the six proxies, state aid, is separated from the others is that a major reason for using this proxy is that, in some cases, data is not available for some of the other proxies. In cases where only the State aid proxy indicates financial distress, we comment separately. All proxies are described further later in the section.

Proxies for financial distress

Proxy	Explanation to classification of airline as financially distressed
1) Stock price performance	Airline stock return falls in the 10% lowest part of the return distribution on the exchange of the airline's primary listing location and/or the airline return is more than 30 percentage points inferior to the index return of the same exchange
2) EBITDA/Interest expense	The airline has a EBITDA/Interest expense inferior to one
3) Actual bankruptcy	Factiva and/or Business Source Premier searches on "collapse" and/or "bankruptcy" indicate that the company has entered into bankruptcy. Datastream listing and delisting dates are investigated in special detail
4) Restructuring of debt as response to difficulties in fulfilling debt obligations	Factiva, Business Source Premier and/or annual report searches on "debt" and "restructure" and/or "debt" and "restructuring" indicate that the company has restructured its debt. Also, annual report introductions and sections on liabilities are read in detail to find evidence of restructuring of debt
5) Default on debt	Factiva, Business Source Premier and/or annual report searches on "bond", "junk bond", "investment grade", "rating", "default", and/or "debt" indicate that the company has defaulted on its debt. Also, annual report sections on liabilities are read in detail to find evidence of default on debt
Receipt of state aid in response to bankruptcy threat	Factiva and/or Business Source Premier searches on "default" and "state aid", "default" and "bailout", "default" and "government", "bankruptcy" and "state aid", "bankruptcy" and "bailout", and/or "bankruptcy" and "government" indicate that the company received state aid as response to bankruptcy threat

Table 2. Proxies for financial distress and explanations for classifications of financial distress.

In case any one of the proxies in table 2 indicates that the company has been in financial distress, it is regarded as financially distressed in that year. After using the six methods above to identify which airlines are in financial distress, we use pairwise correlations to see if the same airlines are identified through all measures.

3.2.1 Stock price performance

Gilson, John and Lang (1990) define a financially distressed firm as one that has insufficient cash flows to meet its debt payments. To obtain a first proxy for this

group the authors look at unadjusted common stock returns at year-end, for stocks listed on New York Stock Exchange and American Stock Exchange. The companies in the bottom five percent of the distribution form a group of financially distressed companies. Gilson, John and Lang (1990) conclude that *extreme negative stock returns are a relatively unambiguous indicator of poor financial performance*.²⁵

In our report, two stock price performance related measures are used:

- A) **The position in the return distribution.** In accordance with the Gilson, John and Lang (1990) methodology, we measure the position of the airline stock in the return distribution of the stocks included in the major index of the stock exchange where the airline has its primary listing location. Since it is, at this stage, better to include too many airlines, rather than too few, a limit of 10 percent is used. Hence, all airlines that show returns in the lowest 10 percent of the distribution are regarded as financially distressed.
- B) **Return relative to the all share index return.** All airline shares that deviate, in the negative direction, with more than 30 percentage points from the index return of the same index as used in A) are regarded as financially distressed.

In order to find out which European airlines are publicly traded, or have been listed at some point during the sample period, the following sources are used:

- **AEA yearbooks.** The ownership of the companies is stated in these reports, and airlines bearing the indication “Free float”, “Floated”, or “Publicly traded” are listed on the stock market in the year of the indication.
- **Annual reports.** To control for potential changes between report dates, information in the annual reports of the companies is used. The reports are not only checked for actual ownership at year-end, but also, searches are performed on the keywords “ownership” and “owner” in order to detect changes in any given year. Moreover, the introductions to the annual reports are read thoroughly to detect whether the stock has been floated or de-listed during the year.
- **Datastream.** In the database, active as well as passive stocks are included, and we perform searches on each of the 28 company names.

²⁵ Gilson, John and Lang (1990), p.327

After identifying the airlines for which stock quotes can be obtained for the full period 2000-2005, or alternatively for parts of the period, annual data is collected from Datastream. The data is obtained for all the airlines as well as for all other shares included in the main indices of the stock exchange where the airlines have their primary stock listing locations.

Using the current constituent lists, rather than an actual lists of all shares included in the index at year end of each year investigated, creates a survivorship bias. The reason for this is that there is a larger probability that shares of companies that are performing well continue being listed, as compared to the shares of companies that are performing poorly. This means that the airline share will, at least in the earlier years, have a larger probability of being in the lowest 10% of the distribution. Previous literature suggests a number of ways of correcting for this.²⁶ However, since the main goal of using this proxy is to see which companies are potentially distressed, a situation where too many companies are found to be financially distressed is less severe than the opposite. We hence do not correct for survivorship bias.

3.2.2 EBITDA/interest expense

Andrade and Kaplan (1998) regard a company as financially distressed if it meets one of the following criteria: 1) EBITDA/interest expense is less than one, 2) The company has attempted to restructure its debt due to difficulties in completing its debt payments, 3) The company has defaulted on its debt, or 4) The company filed for Chapter 11. In this section we study the first criteria, investigating whether the airlines have EBITDA/interest expense inferior to one.

Asquith, Gertner & Scharfstein (1994), in similarity to Andrade and Kaplan (1998), use an interest coverage ratio to detect firms in financial distress. The difference between the two studies is that Asquith, Gertner & Scharfstein (1994) have a more strict condition for financial distress – they demand that a firm has a ratio for EBITDA/interest expenses below one for any two consecutive years, or that the interest coverage is below 0.8 for any give year. According to their study companies

²⁶ Conversation with Andrei Simonov, Associate Professor of Finance at the Stockholm School of Economics, February 2007

rarely take actions to decrease the distress unless at least one of the two criteria is met. The authors also exclude companies that are not publicly traded, since financial information is not required to be complete for those companies.

Since the EBITDA/interest expense measure gives a clear indication as to whether a company is in financial distress or not, we use this method to identify financially distressed airlines. In accordance with the idea in earlier sections of rather including too many than too few airlines as financially distressed, we use the method of Andrade and Kaplan (1998), judging companies that have a coverage ratio of less than one as financially distressed.

Given that operating leasing is used in almost all airlines, but to a varying extent, it is necessary to capitalize the operating leases in order to obtain a measure for EBITDA/interest expense that neither favours nor disfavours companies with a lot of operating leases. The reason for this is that companies that do not capitalize their operating leases bear the full lease expense in the operating result. Since operating leasing is an expense and not a depreciation, it is not automatically added back to obtain EBITDA. This gives rise to a situation where companies with a lot of operating leases have a lower unadjusted EBITDA than their peers with less operating leases or operating leases that are capitalized. Furthermore, companies that have a lot of operating leases will bear the implied interest rate, included in the operating lease expense, in the operating profit rather than as an interest expense. If not adjusted for, this leads to a further depression of the EBITDA.

We use a method described in Koller, Goedhart and Wessels (2005) to capitalize the operating leases, and then add back the implied interest and the implied depreciation to obtain comparable EBITDA/interest expense values for all companies, regardless of levels of operating leases and accounting methods. The method is described in detail below.

The first step is to obtain the asset value as implied by the annual operating lease expense²⁷ (Rental Expense in Koller, Goedhart and Wessels (2005)), the cost of debt and the asset life. All this information is found in the annual reports of the companies.

²⁷ E-mail correspondence with Thomas Hjelström, Course Director Corporate Valuation, PhDStudent, Department of Accounting and Business Law, Stockholm School of Economics

Where neither incremental, nor average, cost of debt is stated, we calculate the average cost of debt as interest expense divided by the interest bearing debt.

$$Asset\ Value_{t-1} = \frac{Rental\ Expense_t}{k_d + \frac{1}{Asset\ Life}}$$

The implied interest is found using the formula:

$$Implied\ interest = Asset\ Value_{t-1} * k_d$$

Implied depreciation is the residual between the operating lease expense and implied interest according to:

$$Implied\ depreciation = Rental\ Expense - Implied\ interest$$

After capitalizing the operating leases, we use the following method to obtain an adjusted EBITDA:

- 1) Start with the Operating result (profit or loss) stated in the income statements of the annual report.
- 2) Add back amortization, depreciation and write-downs in order to get to the reported, unadjusted, EBITDA.
- 3) Add back implied depreciation (from capitalized operating leases).
- 4) Add back implied interest expense (from capitalized operating leases).

We then obtain interest expenses using the method below:

- 1) Start with the interest expense as stated in the notes to financial expenses in the income statement.
- 2) Add the financial lease payments.
- 3) Add the implied interest expense (from capitalized operating leases).

The EBITDA/interest expenses obtained using the method above neither favours, nor disfavours airlines with a lot of operating leases compared to their peers with less operating leases or capitalized operating leases.

The data for this part of the empirical investigation is obtained directly from the company annual reports. A majority of the companies publish their reports on their websites. For the airlines where reports were not available online, we contacted the companies by phone and e-mail at several occasions. Using this methodology we obtained annual reports for all companies except Olympic Airlines, TAROM, Sabena 2000- 2002, JAT and KLM. We checked whether it would be possible to use Orbis data for these airlines, but since there are no notes to the financial statements in the database we were not able to get information about operating leases – something that is critical to this part of the analysis. Hence, we have not been able to study EBITDA/interest expense for these companies.

3.2.3 Actual bankruptcy

As for actual bankruptcy of companies that are as important to the countries in which they operate as the airlines investigated in this report, there is limited risk that there would be no information in the press. Hence, Factiva and Business Source Premier searches are performed on the keywords “bankrupt” and “collapse”. Furthermore, for the companies that are or have been listed, the listing and delisting dates in Datastream are investigated in detail.

3.2.4 Restructuring of debt

The second proxy for financial distress used by Andrade and Kaplan (1998) is the attempt by a company to restructure its debt due to difficulties in completing debt payments. The authors find information about this in the financial reports of the companies as well as from searches in the NEXIS²⁸ database. In the same way, Gilson, John and Lang (1990) search the WSJ Index for references to Default, Bankruptcy or Debt restructuring, in order to identify the companies that have gone through debt restructurings. The three authors consider debt restructurings as one way of emerging from financial distress, defining debt restructuring as *a transaction in which an existing debt contract is replaced by a new contract with one of the following consequences: (i) required interest or principal payments on the debt are*

²⁸ NEXIS is a database with access legal and business sources as well as news; www.nexis.com, March 25, 2007

*reduced, (ii) the maturity of the debt is extended, or (iii) creditors are given equity securities.*²⁹

To find information about debt restructuring among the airlines in our sample we use two methods:

1. **Factiva and Business Source Premier.** Searches on the company name in connection with the key phrases “debt” and “restructure”, as well as “debt” and “restructuring”
2. **Annual reports.** Searches for the same key phrases, as well as thorough reading of introductions as well as parts concerning the liabilities of the companies.

3.2.5 Default on debt

Andrade and Kaplan (1998) also use actual default on debt payments as an indication of bankruptcy. We attempt to identify defaults on debt in the same way as restructuring of debt. Hence, we perform Factiva and Business Source Premier searches on the company name in connection with the keywords “bond”, “junk bond”, “investment grade”, “rating”, “default”, and “debt”. The same searches are performed in each of the annual reports of the companies. In addition, the introductions to the reports as well as the sections on liabilities are studied thoroughly to obtain information on the subject.

3.2.6 State aid

Since the governments of the European countries have, at least historically, frequently protected their legacy carriers by granting them state aid, it would not be correct only to study actual financial difficulties as proxies for financial distress. To check which airlines have received state aid, Factiva and Business Source Premier searches are performed on the company name in combination with “default” and “state aid”, “default” and “bailout”, “default” and “government” as well as “bankruptcy” and “state aid”, “bankruptcy” and “bailout”, and “bankruptcy” and “government”. In cases where the CEO, CFO or another person in a leading position in the company expressed the opinion that the company would have defaulted if not given the state aid, the airline is categorized as financially distressed in the year of the state aid.

²⁹ Gilson, John and Lang (1990), p. 325

3.3 Empirical result

The overall result from the empirical investigation of financial distress among the European airlines is presented in tables 3 and 4.

Airlines in which no financial distress was found

Adria Airways	BMI	Icelandair	Lufthansa	SAS
Air France	Croatia Airlines	JAT	Luxair	Tarom
Air France-KLM	Czech Airlines	KLM	Meridiana	

Table 3. Non occurrence of financial distress among AEA airlines 2000-2005.

Airlines in which financial distress was found and proxy indicating financial distress

	2005	2004	2003	2002	2001	2000
Aer Lingus	EBITDA/IE					
Air Malta	State aid					
Alitalia	Debt restr. Stock price State aid	EBITDA/IE State aid	EBITDA/IE	State aid Stock price		
Austrian	Stock price		Stock price		Stock price	
British Airways					Stock price	
Cyprus Airways	EBITDA/IE State aid	EBITDA/IE Stock price	EBITDA/IE			
Iberia	Stock price					
LOT		EBITDA/IE	EBITDA/IE		EBITDA/IE	
Malev		State aid	State aid		State aid	
Olympic Airlines			State aid	State aid	State aid	State aid
Sabena			EBITDA/IE		State aid Bankruptcy	
Swiss	Stock price		EBITDA/IE Stock price	EBITDA/IE Stock price Bankruptcy	EBITDA/IE Stock price State aid	EBITDA/IE Stock price
TAP						EBITDA/IE
Turkish Airlines						EBITDA/IE

Table 4. Occurrence of financial distress among AEA airlines 2000-2005 and proxy that indicated financial distress.

Out of the 28 airlines in the sample, 14 have been in financial distress at least once between 2000 and 2005. This result gives an initial indication of the severity of the crisis of the European airline industry in the beginning of the 21st century.

Furthermore, many of the airlines have been in financial distress more than once during the period. Using the various methods described in the methodology section, 33 indices of financial distress are found, giving an average of 1.2 years of financial distress for the whole sample, or 2.4 years for the 14 companies that have been in financial distress. The financial distress is, however, not evenly spread. While some companies, such as Alitalia, Olympic Airways and Swiss have been in distress over

practically the whole period, others, such as Aer Lingus, Iberia and British Airways have only had one year of financial distress. The results obtained from each method of detection are described in detail in the different sections below. Air Malta, Malev and Olympic Airlines are only identified as financially distressed through the State aid proxy. The answer to the question whether financially distressed airlines received state aid is hence obvious for these airlines. The reason for still including state aid as a proxy for financial distress is that lack of data prevents us from using some of the other proxies that would potentially indicate financial distress in these cases.

In table 5 we see the methods that are positively and statistically significantly correlated at the 5% level. The result indicates that airlines that are defined as financially distressed through one method are not necessarily defined as financially distressed through other methods. Indicators for financial distress that are positively and significantly correlated with each other in at least one of the years are: 1) Actual bankruptcy and stock distribution, 2) Stock distribution and EBITDA/interest expense, 3) Actual bankruptcy and debt restructuring, 4) Actual bankruptcy and EBITDA/interest expense, 5) Actual bankruptcy and state aid, 6) Debt restructuring and stock distribution, 7) State aid and EBITDA/interest expense, and 8) State aid and stock distribution. The fact that there is no perfect overlap between the methods justifies using them all to identify which companies are in financial distress.

Indicators with statistically significant pairwise correlation at the 5% level

Indicator 1	Indicator 2	TOTAL	2005	2004	2003	2002	2001	2000
Actual bankruptcy	Stock distribution	X	X			X		
Stock distribution	EBITDA/Interest expense				X	X		X
Actual bankruptcy	Debt restructuring	X	X					
Actual bankruptcy	EBITDA/Interest expense	X				X		
Actual bankruptcy	State aid	X					X	
Debt restructuring	Stock distribution	X	X					
State aid	EBITDA/Interest expense		X					
State aid	Stock distribution						X	

Table 5. Measures of financial distress with a positive correlation that is statistically significant at the 5% level.

3.3.1 Stock price performance

Among the airlines that have been members of AEA at some point between 2000 and 2005³⁰, there are 12 companies that are, or have been, publicly traded. Those

³⁰ The end of the study is limited to 2005 due to availability of annual reports.

companies are Air France, Air France-KLM, Alitalia, Austrian, British Airways, Cyprus Airways, Finnair, Iberia, KLM, Lufthansa, SAS and Swiss.

For the periods when the stocks have been listed between January 2000 and December 2005, stock price data is obtained for the airline shares as well as all other shares currently included in the main index of the stock exchange where the airline has its primary listing location. The comparison is then done in two ways. First, we compare the return of each airline stock to the return on the other shares on the stock exchange, and the airlines stock price performance percentile is determined. If the return of the airline is in the 10% lowest part of the distribution of returns on the exchange, it is considered financially distressed. Second, we look at the excess return over the market portfolio. In this case, the airline is regarded as financially distressed if it underperforms the index with more than 30 percentage points in any given year.

For companies that have been traded parts of a year (i.e. Air France-KLM 2004, Air France 2004, KLM 2004, Swiss 2002 and 2003) the return of the stock is compared to the return of the other shares on the index for the same period.

Airline stock price performance percentiles

Stock	Index (name)	2000	2001	2002	2003	2004	2005
AF-KLM	France CAC All Shares					25%	48%
Air France	France CAC All Shares	71%	25%	22%	63%	74%	
Alitalia	Milan Mibtel	14%	16%	3%	34%	30%	1%
Austrian	Wiener Boerse Index	11%	20%	30%	11%	69%	7%
BA	FTSE350	39%	5%	29%	88%	15%	72%
Cyprus Air	Cyprus-DS market	33%	43%	89%	23%	23%	69%
Finnair	OMX Helsinki	62%	37%	58%	63%	32%	97%
Iberia	Madrid SE General		77%	86%	91%	29%	4%
KLM	Amsterdam SE All Shares	41%	16%	51%	70%	84%	
Lufthansa	CDAX General 'Perf' Index	74%	44%	52%	61%	27%	42%
SAS	Affarsvarlden General Index	74%	43%	52%	53%	16%	75%
Swiss	Swiss Medium and Large Companies	6%	1%	1%	1%	16%	10%

Table 6. Airline stock price performance percentiles. Grey shading indicates financial distress.

As seen in Table 6, five of the airlines are found to be in the 10 percent lowest part of the return distribution; Alitalia, Austrian, British Airways, Iberia and Swiss.

The result from the second method, the excess return of the airline stock over the index return, is presented in table 7 on the next page.

Excess returns on airline stocks

	2000	2001	2002	2003	2004	2005
AF-KLM					-3%	30%
France CAC All Shares					4%	25%
Deviation					-0.07	0.06
Air France	33%	-32%	-43%	32%	20%	
France CAC All Shares	0%	-20%	-31%	18%	5%	
Deviation	0.33	-0.13	-0.12	0.14	0.15	
Alitalia	-19%	-48%	-66%	8%	-3%	-52%
Milan Mibtel	5%	-25%	-23%	14%	18%	14%
Deviation	-0.24	-0.23	-0.42	-0.06	-0.22	-0.66
Austrian	-32%	-35%	-12%	-6%	48%	-32%
Wiener Boerse Index	-7%	2%	3%	30%	49%	43%
Deviation	-0.25	-0.37	-0.15	-0.36	-0.01	-0.75
BA	2%	-48%	-31%	72%	1%	42%
FTSE350	-9%	-15%	-25%	16%	9%	18%
Deviation	0.11	-0.33	-0.06	0.56	-0.08	0.24
Cyprus Air	-86%	-49%	1%	-28%	-44%	54%
Cyprus-DS market	-67%	-51%	-30%	-14%	-4%	52%
Deviation	-0.19	0.02	0.31	-0.14	-0.40	0.01
Finnair	6%	-9%	2%	48%	7%	119%
OMX Helsinki	-11%	-32%	-34%	4%	3%	31%
Deviation	0.17	0.24	0.36	0.43	0.04	0.88
Iberia		110%	28%	66%	13%	-9%
Madrid SE General		-7%	-23%	27%	19%	21%
Deviation		1.18	0.51	0.39	-0.06	-0.29
KLM	-4%	-45%	-28%	42%	35%	
Amsterdam SE All Shares	-6%	-21%	-35%	6%	3%	
Deviation	0.02	-0.24	0.07	0.37	0.32	
Lufthansa	20%	-42%	-40%	56%	-18%	22%
CDAX General 'Perf' Index	-10%	-18%	-40%	38%	8%	28%
Deviation	0.29	-0.24	0.00	0.18	-0.27	-0.06
SAS	25%	-21%	-27%	38%	-12%	74%
Affarsvarlden General Index	-12%	-17%	-37%	30%	17%	33%
Deviation	0.37	-0.04	0.10	0.08	-0.29	0.42
Swiss	-18%	-99%	-95%	-55%	-7%	2%
Swiss Medium and Large Con	11%	-22%	-1%	22%	7%	36%
Deviation	-0.29	-0.77	-0.94	-0.77	-0.14	-0.34
Average airline return	-7%	-29%	-28%	25%	3%	25%
Average index return	-11%	-21%	-25%	17%	12%	30%
Average deviation	0.03	-0.08	-0.03	0.08	-0.09	-0.05
Median airline return	-1%	-42%	-28%	38%	-1%	26%
Median index return	-8%	-20%	-30%	18%	8%	30%
Median deviation	0.06	-0.23	0.00	0.14	-0.08	-0.02

Table 7. Returns on shares and indices, excess returns of shares over index returns. Grey shading indicates financial distress.

By using the arbitrarily chosen limit of a negative deviation from the index return of 30 percentage points to categorize an airline as financially distressed, the following companies are found: Alitalia, Austrian, British Airways, Cyprus Airways, and Swiss. The list is similar to the one yielded from the stock price performance percentile

method, except that Cyprus Airways is added, and that Iberia cannot be identified as distressed using this method. The airlines identified as financially distressed through the two stock price related methods are hence: Alitalia, Austrian, British Airways, Cyprus Airways, Iberia and Swiss.

3.3.2 EBITDA/interest expense

EBITDA/interest expense measures whether the company can cover its debt obligations with the profit that remains after the company has paid its operating expenses less depreciation and amortization. If the measure shows a value below 1, the company is regarded as financially distressed.

Data is obtained for all companies for which annual reports are accessible. As described in the data section this excludes Olympic Airlines, TAROM, Sabena 2000-2002, JAT and KLM. Also, for Croatia Airlines, Adria Airways and Meridiana, the information on operating leases and/or interest expenses is not detailed enough to obtain a reliable measure for adjusted EBITDA/interest expense. Hence, those companies are not evaluated using this method. For the companies that provide detailed enough data for the analysis, the results are presented in table 8.

EBITDA/Interest expense 2000-2005

	2000	2001	2002	2003	2004	2005
Aer Lingus	2.7	0.5	2.3	4.0	2.2	3.8
Air France	4.1	3.9	4.4	3.7	4.4	5.0
Air Malta	2.2	3.0	2.5	1.7	1.8	1.8
Alitalia	1.5	1.7	2.1	0.6	0.9	2.5
Austrian	3.3	1.2	3.9	5.9	4.1	3.2
BMI	2.0	2.1	4.4	7.3	5.1	3.0
British Airways	2.0	2.5	1.8	3.1	3.7	4.2
Cyprus Airways	3.8	3.6	4.0	-1.1	-0.5	0.8
Czech Airlines	3.2	1.4	2.0	4.8	3.4	4.4
Finnair	5.8	4.5	5.0	3.4	4.0	5.7
Iberia	2.0	1.9	3.3	3.0	3.0	3.6
Icelandair	1.1	1.4	4.6	3.4	3.0	1.5
LOT	6.5	0.3	4.4	1.0	-0.1	2.3
Lufthansa	6.5	2.8	5.0	3.3	6.8	6.6
Luxair	6.5	5.5	15.2	9.2	6.2	7.9
Malev	1.5	1.0	2.3	2.3	2.6	1.7
Sabena	N/A	N/A	N/A	0.9	2.0	2.2
SAS	3.9	1.6	1.6	1.4	1.7	2.1
Swiss	-1.0	-0.7	-1.8	-1.3	5.0	4.9
TAP	0.9	2.0	2.9	3.0	2.4	2.1
Turkish Airlines	-0.1	1.1	3.1	9.9	9.3	2.1

Table 8. EBITDA/Interest expense. Grey shading indicates EBITDA/Interest expense inferior to 1.

From Table 5 we identify Alitalia, TAP Portugal, Cyprus Airways, Sabena, LOT, Turkish Airlines, Aer Lingus and Swiss as financially distressed.

3.3.3 Actual bankruptcy

From Factiva and Business Source Premier searches on “bankruptcy” and “collapse” in connection with the company names of the AEA airlines, information is obtained on actual bankruptcies as well as bankruptcy threats. Most of the companies are mentioned as being threatened by bankruptcy, especially in connection with the loss of traffic and increased insurance premiums following September 11. However, only two companies – Sabena and Swiss – are reported as having entered into actual bankruptcy. Those two cases are described in detail in Appendix B.

3.3.4 Restructuring of debt

The searches in Factiva, Business Source Premier and annual reports on phrases related to debt restructurings yield only one result; that Alitalia was financially distressed in 2005 when a bond loan was restructured. The maturity of the loan was changed from 2007 to 2010, while the annual interest rate was increased from 2.9% to 7.5%.³¹

3.3.5 Default on debt

None of the companies in the sample returns relevant results for searches in Factiva, Business Source Premier and annual reports on the keywords “bond”, “junk bond”, “investment grade”, “rating”, “default”, and “debt”.

3.3.6 State aid

Searches in Factiva, Business Source Premier and annual reports on the keywords related to state aid in combination with each of the company names indicate that many of the airlines have received state aid, and that the aid has often been given as a direct response to a threat of bankruptcy. Companies that are identified as financially distressed through this method are: Alitalia, Olympic Airlines, Cyprus Airways, Malev, Air Malta, Swiss and Sabena. Detailed descriptions of all the cases are found in Appendix A.

³¹ Alitalia annual report 2005, p. 37

4. Economic Distress

4.1 Method and data

After obtaining the list of financially distressed companies from the previous section, we investigate whether these companies have also been in economic distress. In addition, we study economic distress for the airlines that were not identified as financially distressed. Firms are classified as economically distressed when they either: 1) Show negative operating results when adjusting for implied interests from operating leases³², or 2) Show positive operating results, but negative net income, and are positioned in the lowest 10 percent of the distribution of companies' operating result/revenue in a selected base year.

Having obtained a list of economically distressed airlines, we conduct pairwise correlations between each of the methods of detecting financial distress with economic distress in each year 2000-2005. We also investigate the correlations between each proxy for financial distress and economic distress over the entire period.

4.1.1 Negative Operating results

Schwartz (2005) concludes that insolvency can be a function of economic distress, financial distress or both. He defines economic distress as the situation when a company does not earn revenues enough to cover its costs, financing costs excluded. We use Schwartz (2005) definition as one method to detect economic distress. Hence, companies that report negative operating results after adding back the implied interest expense from the capitalized operating leases are regarded as economically distressed.

4.1.2 Negative Net income, lower part of distribution

Companies that show positive operating performance, but negative results after financing costs and taxes are investigated more in detail. In order to create a point of reference for these companies, we chose the year 2000 as a base year, and obtain net income and operating results for all companies in the sample (financially distressed firms as well as non financially distressed) for that year. The reason for the choice of

³² We use adjusted operating results when annual reports are accessible and information on operating leases and interest expenses is detailed enough to adjust for implied interest from capitalized operating leases. In cases where the necessary data for the adjustment is not available we use raw data on operating results from annual reports or Orbis.

2000 as base year is that it was not neither a particularly positive nor a particularly negative year.³³ In order to obtain comparable measures we normalize operating result and net income by dividing them with the revenue.

Normalized net income and normalized operating performance for the companies with positive operating performance, but negative net income, are then, one by one, compared to the benchmark. Companies that are in the 10 percent lowest part of the distribution are judged as economically distressed.

4.2 Empirical result

None of the companies with a positive operating result but negative net income are found to be in the bottom 10% of the distribution of neither normalized net income, nor normalized operating result. Hence, even though both methods described in the method section are used, only the negative adjusted operating results finally helps in detecting economic distress.

Out of the 14 companies that experienced financial distress at some point during the 5-year period, 11 experienced economic distress in at least one of the years in the period, however not necessarily in the same year as the financial distress. Among the financially distressed firms the only ones that did not show any signs of economic distress at any point between 2000 and 2005 were British Airways, Iberia and Sabena.

Financial and economic distress among AEA airlines in financial distress

	2005	2004	2003	2002	2001	2000
Aer Lingus					f, e	
Air Malta	e	e	f, e	e		
Alitalia	f	f, e	f, e	f, e	e	e
Austrian	f, e		f		f, e	
British Airways					f	
Cyprus Airways	f, e	f, e	f, e	e	e	e
Iberia	f					
LOT		f, e	f, e		f, e	
Malev	e	f, e	f, e		f, e	e
Olympic		e	f, e	f	f	f
Sabena			f		f	
Swiss	f, e	e	f, e	f, e	f, e	f, e
TAP						f, e
Turkish Airlines					e	f, e

Table 9. Economic distress (e) and Financial distress (f) among AEA airlines in Financial distress. Grey shading indicates combination of financial and economic distress.

³³ AEA yearbook 2001, p.5-6, 8-14

In table 9 we see the indices of financial distress and economic distress per airline for each year between 2000 and 2005. The number of indices of economic distress among the airlines in financial distress is 37, while the number of indices of financial distress is 33. Among the airlines that were not in financial distress at any point during the period, only three indices of economic distress are found: Lufthansa in 2001 and 2003, and Luxair in 2003. The total number of economic distress cases is hence 40.

Number of airlines in financial and economic distress

Measure	Number	Percent of AEA airlines
Airlines in financial distress	14	50%
Airlines in economic distress	13	46%
Airlines only in financial distress	3	11%
Airlines only in economic distress	2	7%
Airlines in both financial and economic distress	11	39%

Table 10. Number of airlines in financial distress and economic distress. Based on a total number of airlines of 28.

Number of indices of financial and economic distress

Measure	Number	Percent of indices
Indices of financial distress	33	21%
Indices of economic distress	40	26%
Indices of only financial distress	9	6%
Indices of only economic distress	16	10%
Indices of financial and economic distress simultaneously	24	15%

Table 11. Indices of financial distress and economic distress. Bases on a total number of indices of 157.

From the table 10 and 11 we see that economic distress existed among airlines that were in financial distress as well as among those that were not in financial distress. While 50% of the AEA airlines were in financial distress at some point during the period, 46% were in economic distress. On a per-case basis, 21% of the indices showed financial distress, while 26% showed economic distress.

Interaction between financial and economic distress

Measure	Percent
Percent of airlines in financial distress also in economic distress	79%
Percent of indices of financial distress accompanied by economic distress	73%
Percent of airlines not in financial distress in economic distress	14%
Percent of indices of non financial distress accompanied by economic distress	13%

Table 12. The interaction of economic distress and financial distress across the sample period and casewise.

The above table indicates that, in our sample, 79% of the companies that were in financial distress at some point during the 6-year period were also in economic distress at some point during the same period. On the other hand, only 14% of the companies that were not in financial distress experienced economic distress at some point.

Table 12 also shows how financial and economic distress interact on a per-case (airline and year) basis. We see that in 73% of the cases, financial distress was accompanied by economic distress. Out of the indices of no financial distress only 13% showed economic distress. This is a first indication that financially distressed airlines are also economically distressed, and that economic distress is most common in the years of financial distress.

From the table below we see that the pairwise correlation between financial distress and economic distress is significant at the 5% level for each of the years, indicating that for any given year financially distressed firms were also economically distressed while non financially distressed firms were not economically distressed. Also, for the entire period, the correlation between financial distress and economic distress is strongly significant. This means that firms that are in financial distress at some point during the period are also in economic distress at some point during the period, while non-financially distressed firms have generally not experienced economic distress.

Indicators with statistically significant pairwise correlation at the 5% level

Indicator 1	Indicator 2	TOTAL	2005	2004	2003	2002	2001	2000
Economic distress	Financial distress	X	X	X	X	X	X	X
Economic distress	EBITDA/Interest expense	X	X	X	X	X	X	X
Economic distress	State aid	X	X	X	X			
Economic distress	Stock distribution					X		
Economic distress	Actual bankruptcy					X		

Table 13. Statistically significant correlations between financial and economic distress at the 5% level.

The relationship between the indicators for financial distress and economic distress varies across the years. The correlation between economic distress and EBITDA/interest expense is significant in all years and for the full period. Moreover, economic distress and state aid are positively and significantly correlated in 2005, 2004 and 2003 as well as for the total period. This means that if a firm has received

state aid at some point during the period, the firm has also been economically distressed at some point and vice versa. Economic distress is also significantly and positively correlated with stock distribution and actual bankruptcy in 2002.

From this section we see that, even though economic distress existed also when there was no financial distress, it was far more common not only among the firms that at some point suffered from financial distress, but also in the actual years of the financial distress. A strong correlation between financial and economic distress was found.

5. Analysis – financial distress and economic distress

The empirical investigation shows that 14 out of the 28 airlines in the sample of AEA airlines experienced financial distress at least in one year between 2000 and 2005. Out of the 14 airlines 11 show signs of economic distress. In fact, for 73% of the indices of financial distress, there is also economic distress. The result indicates that not only did European airlines have problems serving their debt during the period, but also, they had difficulties covering their operating costs with their operating revenue.

These findings are in line with previous research, claiming that financially distressed firms are often also in economic distress. One of the previous academic articles that discusses financial and economic distress jointly is the Asquith, Gertner & Scharfstein (1994) paper. The main purpose of the article is to analyze ways in which financially distressed firms work towards avoiding bankruptcy through public and private debt restructurings, asset sales, mergers, and capital expenditure reductions. The paper studies 102 companies that issued high-yield junk bonds subsequent to entering financial difficulties in the 1970s and 1980s. The authors find that 76 of the 102 companies took actions to restructure. In their study they do not aim at explicitly investigating whether financially distressed firms are also in economic distress, but since they want to make sure that they select companies that are only financially distressed, they study the issue thoroughly. In order to minimize the impact of economic distress the authors examine highly leveraged companies, where a relatively small decline in operating performance would lead to financial distress. The authors find three reasons for firms to be financially distressed: 1) High interest expense, 2) Poor operating performance relative to other companies in their industry, and 3) An

industry downturn. Investigating the relative importance of the three factors in their sample, they find that poor operating performance relative to the industry median is the most important reason for distress and explains over 55 percent of the lack of cash, while the other two factors account for just above 20 percent each. This implies that few firms in the sample suffer from financial distress without also being economically distressed – even in a sample where the authors have tried to correct for this by only looking into highly leveraged firms.

Andrade and Kaplan (1998) study the cost of financial distress by investigating 31 highly leveraged transactions that become financially distressed. The authors point out that many previous studies aiming at investigating the cost of financial distress have in fact examined economically distressed companies. They claim that it is hard to measure financial distress, and that *The difficulty is driven by an inability to distinguish whether poor performance by a firm in financial distress is caused by the financial distress itself or is caused by the same factors that pushed the firm into financial distress in the first place.*³⁴ The authors mention many earlier papers that claim to study the cost of financial distress and they indicate that many of the firms in the samples of those papers have negative operating income, and are hence economically distressed as well as financially distressed. This means, according to Andrade and Kaplan (1998), that it is impossible to say whether these earlier papers study the cost of financial distress, economic distress or a combination of the two.

6. State aid

In this part we assess whether financially distressed companies that received state aid had a superior or inferior operating performance compared to the financially distressed firms that did not receive state aid. We also investigate whether state aid has been more likely to be given in countries where the unemployment rate is higher and/or where investor protection rights are weaker.

6.1 Theoretical background

We found few articles in this area that are relevant for our thesis. The most important one is Nicola Gennaioli and Rossi (2006).

³⁴ Andrade and Kaplan (1998), p.1444

The authors study the possibility for the parties to efficiently solve financial distress by contract instead of exclusively relying on state intervention. The authors study which financial contracts are optimal depending on whether the investor protection against fraud is strong or weak, and they investigate the efficiency of the resulting resolution of financial distress. The authors argue that even without legal restrictions the crucial factor for the ability of the contracts to collateralize the firm's reorganization value is the degree of managerial tunnelling³⁵. That is when the persons controlling the firm can divert profits and only a small amount of the reorganization proceeds can be collateralized to the creditors. The authors find that when investor protection is strong, the reorganization value of the firm can be collateralized by a "convertible debt" contract and the first best is to issue a convertible debt security to a large, secured creditor who has the exclusive right to reorganize or liquidate the firm. On the other hand when investor protection is weak, the creditor is better off by a quick liquidation than through a long reorganization, which would only increase the risk of tunnelling. Hence the only feasible debt structure is standard foreclosure rights, even if it means overliquidation.³⁶ The authors test these results both for a single and multiple creditors since a major argument for state intervention in bankruptcy is that under contractual freedom there might be conflicts among creditors that might lead to liquidation of viable firms.³⁷ They reach the same conclusions for both scenarios. These results show that countries that have stronger investor protection have a comparative advantage as they can use more flexible financial contracts³⁸ and more flexible resolutions of financial distress³⁹.

6.2 Data

As seen from the previous section, the airlines that experienced financial distress are Alitalia, Austrian, Cyprus Airways, Olympic Airlines, Malev, Air Malta, TAP Portugal, Sabena, Lot, Turkish Airlines, Aer Lingus, Swiss, Iberia and British Airways. The ones that received state aid are presented in the table below.

³⁵ Shleifer and Vishny (1997)

³⁶ Gennaioli, Rossi (2006), p1-4

³⁷ Jackson (1986)

³⁸ Lerner and Schoar (2005), Qian and Strahan (2006)

³⁹ Djankov et al (2006)

AEA Airlines that received state aid 2000-2005

Airline	Year
Alitalia	02, 04, 05
Cyprus Airways	05
Olympic	00, 01, 02, 03
Malev	01, 03, 04
Air Malta	03
Sabena	01
Swiss	01

Table 14. Airlines that received state aid and the year of state aid.

6.3 Method

Having obtained information on which of the financially distressed airlines received state aid, we assess which of the groups performed better – the one receiving state aid or the one not receiving state aid. We do this in two steps. First, we compare the operating result/revenue of the two groups, in order to see if companies that received state aid reported a superior performance in terms of actual levels and improvements – over the entire period as well as subsequent to the state aid. Second, we examine the revenue, operating result, net income and operating costs generated per unit of labour cost, in order to see which of the groups uses its labour more efficiently. We are also interested in finding out if there is a difference in the way the measures evolve over time in the two groups. Having finalized this comparison of the companies per se, we examine the unemployment rates and investor protection per country to assess the characteristics in terms of these measures of the countries where state aid was given.

6.3.1 Normalized operating result

First, in order to obtain comparable measures for operating result across the companies the measures are normalized. That is, operating result/revenue⁴⁰ is calculated for all years between 2000 and 2005 for each airline that was found to be in financial distress at some point during the period. The average and median for the group of airlines that received state aid is compared to the average and the median of the group that did not receive state aid.

Thereafter the yearly change in operating result/revenue is calculated for each individual airline. In order to learn whether the overall trend during the full period

⁴⁰ Operating result is adjusted for implied interest from capitalized operating leases when possible, see footnote 32

was different between the two groups we compare the average and median yearly normalized operating result in the period 2000-2005.

Since we want to obtain comparable figures across the years, we then calculate an average (for the entire sample of financially distressed firms) change in normalized operating performance for each year. This average is then subtracted from the annual change in normalized operating result for each airline, in order to calculate an excess annual change in normalized operating result. The advantage of this measure, compared to the non-excess values, is that it allows for a comparison of the change in operating performance not only across airlines in any given year, but also across airlines across years. Having obtained the excess annual change in normalized operating result for all financially distressed airlines for all years, we compare the performance subsequent to the first year of state aid of the group that received state aid with the performance subsequent to the first year of financial distress for the group that did not receive state aid. We compare the average and median values, as well as explain the outliers that influence the result.

If we had compared the performance of the companies that received state aid from their first instance of state aid with the performance of the group that did not receive state aid for the same period, we would have obtained a measure that favours companies that received state aid. The reason for this is that companies that were in severe financial distress and are still operating are more likely to have improved their normalized operating performance than companies that were not initially in financial distress. Since the companies that were granted state aid were all in financial distress in the year of the aid, the comparison we choose to make does not systematically favour any one of the groups.

For all variables described above we perform t-tests and non-parametric tests (Mann Whitney z and Kolmogorov-Smirnov z) for independent samples to find out whether there are statistically significant differences in means and medians between the group of airlines that received state aid and the group that did not receive state aid. The M-W z-statistics is often referred to as indicating the difference in medians, but unless the condition of equal distributions in the groups is satisfied, it only indicates whether

there is a difference in the distribution of ranks between the groups.⁴¹ The K-S z-statistics is a *function of the combined sample size and the largest absolute difference between the two cumulative distribution functions*⁴², and the null hypothesis is that the groups have equal distributions. Hence, if we cannot reject with the K-S z-test that the distributions are equal, we use the M-W z-test to test for equality of medians.

We first look at whether the differences are statistically significant at the 5% level. Given our small sample, we also comment on results with a t-statistic or M-W z-statistic superior to 1.2 or inferior to -1.2, indicating a relatively strong statistical significance when the data set is small. The group of airlines that received state aid is group 1, and the group that did not receive state aid is group 0, meaning that a negative difference in our test variables indicates that companies receiving state aid had lower mean or median. For each of the cases, Levene's test for equality in variances is performed, in order to see whether the t-test can be performed under the assumption of equal variances in the two groups. Having presented the results from the t- and z-tests we also comment on the economic significance of the results.

Initially, we aimed at comparing the excess annual percentage change in normalized operating result. However, since many of our normalized operating results are negative, such a comparison would not be meaningful. Hence, we compare the changes in percentage points. In percentage terms, this systematically disfavours companies that started from a low level, which is the case for most airlines that received state aid. We do not control for this quantitatively, but take into account in our qualitative analysis. The ideal measure would have been a ratio between the pre state aid excess annual change in normalized operating result and the post state aid change in the same measure. This ratio would then have been compared to the same measure prior and post the first year of financial distress for the group that did not receive state aid. This method would have shown if the annual improvement of change in normalized operating performance from the period before state aid/financial distress to the period after state aid/financial distress differed between the groups. However, due to a limited data set (in terms of number of years and number of companies) such a comparison would not produce reliable results.

⁴¹ http://www.graphpad.com/help/Prism5/prism5help.html?checklist_mannwhitney.htm

⁴² SPSS 14.0 for Windows help section

6.3.2 Labour cost income generation

In order to further examine reasons for the changes in normalized operating result we study the revenue, operating result, net income and operating cost relative to the labour cost. The reason for investigating this factor is that almost all airlines have launched cost-cutting programs where a main aim is to reduce the labour cost. This is because labour cost is usually the single largest operating cost item over which management has influence⁴³. We hence examine whether there is a difference between the groups in the ratios, and whether the group that received state aid or the group that did not receive state aid improved its measures more.

We first study the difference in average and median levels between the two groups for each of the years regarding revenue/labour cost, operating result/labour cost, net income/labour cost and operating cost/labour cost. Thereafter, we examine the average annual development of the measures over the whole period in the two groups. Having done this, we do the same exercise as in the previous section of calculating annual change in excess normalized operating measures, but this time with each of the measures related to labour cost. The starting years for the comparison are the same as for the overall measure; hence the first year of state aid for the companies that received state aid and the first year of financial distress for the companies that did not receive state aid. As in the previous section the average and median for the group of airlines that received state aid are compared to the average and the median of the group that did not receive state aid. We also perform t-tests and z-tests (M-W and K-S) to see if the differences in means and medians between the group that received state aid and the one that did not receive state aid are statistically significant. As in the section above we comment on differences that are significant on the 5% level as well as those with t-statistics or M-W z-statistics superior to 1.2 or inferior to -1.2. Given our small sample size, we also look at the economic significance of the results, which might be large even if the statistical significance is weak.

6.3.3 State aid, unemployment and investor protection rights

Within the scope of this thesis it is too complex to assess the total cost of bankruptcy. Instead we study two characteristics of a country, the unemployment rate and investor

⁴³ Doganis (2005), p.10

protection rights, in order to see if there are differences in the measures between countries that granted state aid to their ailing airlines and countries that did not. We choose these two factors because they represent two proxies for how costly it would be to the society if the airline were to be liquidated. High unemployment is chosen as a proxy because in countries with high unemployment the workforce that would enter into unemployment in case of bankruptcy would have less alternative use. The choice of investor protection rights as a second proxy is inspired by Gennaioli and Rossi (2006), who argue that state intervention would be more efficient in countries where investor protection rights are weak than in countries where they are strong. None of these proxies produce evidence as to whether state aid is efficient from the point of view of society, but only allows us to conclude whether state aid is granted in countries where it would be more efficient from the general equilibrium standpoint than it would be in the other countries.

Unemployment rates are gathered from Eurostat for all EU member countries, whereas Econstats is used for Switzerland and Iceland. The average level of unemployment is calculated for 1995-2005 as well as for 2000-2005. Both periods yield similar results, and we hence choose the data from the longer time period to get a longer trend. Thereafter the countries are ranked according to their average unemployment level over the period. The average and median unemployment for the group of airlines that did not receive state aid are compared with the average and median of the group of airlines that received state aid. T-tests and z-tests (M-W and K-S) are used in the same way as in the previous section to investigate whether there is a statistically significant difference in mean and medians between the two groups.

The data on investor protection rights is collected from two sources: 1) the Investor Protection Index of the World Bank and 2) the La Porta's, Lopez-de-Silanes' and Shleifer's (2006) study of the effect of security laws on stock market development in 49 countries.⁴⁴ The World Bank investor protection index is an average of several sub indices: the transparency of transactions; the extent to which directors are liable for damages to the company and shareholders' ability to sue officers and directors for

⁴⁴ Porta, Lopez-de-Silanes, Shleifer (2006)

misconduct.⁴⁵ From La Porta, Lopez-de-Silanes and Shleifer (2006) we use three indicators: 1) the disclosure requirements index, 2) the index of liability standards, and 3) the index of public enforcement. The *disclosure requirements index* equals the arithmetic mean of 6 different variables: disclosure requirements concerning prospectus, compensation, shareholders, inside ownership, irregular contracts and transactions.⁴⁶ The *index of liability standards* equals the arithmetic mean of liability standard for the issuer and its directors, the liability standard for distributors and liability standard for accountants.⁴⁷ The issuer is defined as a domestic corporation that raises capital through an IPO of common shares. The distributor advises the issuer on the preparation of the prospectus and assists in marketing the securities but does not authorize the prospectus.⁴⁸ The *index of public enforcement* equals the arithmetic mean of the supervisor characteristics index, rule-making power index, the investigative powers index, the orders index and the criminal index.⁴⁹

The average and median index value for each of the investor protection proxies used is calculated for the group of airlines that received state aid as well as for the group that did not. Differences in means and medians are tested for using t-tests and z-tests (K-S and M-W).

6.4 Empirical results

6.4.1 Normalized operating result

The average and median yearly operating result/revenue in the two groups – the one with airlines that received state aid at some point during 2000 and 2005 and the one where no state aid was given – are presented in the tables below.

Yearly average Operating result/Revenue 2000-2005

Average levels	2005	2004	2003	2002	2001	2000
No state aid	5.01%	3.77%	6.55%	3.99%	-0.22%	2.07%
State aid	-0.94%	-6.03%	-6.63%	-1.90%	-2.01%	-1.83%

Table 15. Yearly average Operating result/Revenue

⁴⁵ Doing Business database, World Bank (2006)

⁴⁶ Porta, Lopez-de-Silanes, Shleifer 2006 p.6

⁴⁷ Ibid p.7

⁴⁸ Ibid p.6

⁴⁹ Ibid p. 9

Yearly median Operating result/Revenue 2000-2005

Median levels	2005	2004	2003	2002	2001	2000
No state aid	4.37%	3.65%	5.48%	4.91%	-2.09%	2.94%
State aid	-1.15%	-2.74%	-4.57%	-0.95%	-0.80%	-0.78%

Table 16. Yearly median Operating result/Revenue

From these two tables, we see that the group of airlines that received state aid underperformed the other group in all years of the sample period when looking at average values, and in all years except 2001 when looking at the medians. We also notice that the airlines that received state aid on average as well as median reported operating losses in all years.

From the K-S z-test in table 17 we see that we cannot reject the null hypothesis of equal distributions between the two groups. This indicates that we can interpret the M-W z-statistics as a test for equality of medians. When analyzing the t-statistics⁵⁰ and the M-W z-statistics, we find that the differences in means and medians between the group of airlines that were granted state aid and the group that did not receive government subsidies are not statistically significant at the 5% level. When sample size is this small, however, standard errors are likely to be so high that practically no differences would be statistically significant. In table 15 and 16 we notice that the differences are still economically very large; e.g., an operating loss of 6% of revenues is economically very different from an operating profit of 6% of revenues. We also notice, when looking at the t-statistics in table 17, that two of the t-values, in 2002 and 2003, are below -1.2. Given our small sample this indicates a relatively high statistical significance. The same is true for the M-W z-statistics in 2002, 2003 and 2004. Moreover, all t-value have the expected signs, showing direction-wise that companies that received state aid underperformed their peers that did not receive state aid.

⁵⁰ Given the result of Levene's test for equality in variances (the first two columns in the test output) the t-test is performed under the assumption of equal variances. This is the case for all the t-tests in this paper except for net income/labour cost in 2000 and labour cost/operating cost in 2005 where we reject the possibility of performing the t-test under an assumption of equal variances.

Independent samples tests for equality of means and medians between state aid and no state aid groups

	Levene's test for eq. of variances		T-test for eq. of means		Z-tests for eq. of medians			
	F	Sig.	t	Sig. 2-tailed	M-W z	Exact Sig. 2-tailed	K-S z	Asymp. Sig. 2-tailed
Operating result / Revenue 2005	3.61	0.08	-0.86	0.41	-0.88	0.44	0.75	0.63
Operating result / Revenue 2004	0.01	0.91	-1.15	0.27	-1.68	0.11	1.08	0.19
Operating result / Revenue 2003	0.28	0.61	-1.82	0.09	-1.94	0.06	1.16	0.14
Operating result / Revenue 2002	2.23	0.16	-1.44	0.18	-1.32	0.22	1.05	0.22
Operating result / Revenue 2001	0.69	0.42	-0.47	0.65	-0.15	0.94	0.39	1.00
Operating result / Revenue 2000	0.43	0.53	-1.05	0.31	-0.88	0.44	0.61	0.85

Table 17. T-tests and z-tests for equality in means and medians between companies that received state aid and the ones that did not.

In order to see if the companies that received state aid also performed worse in terms of improvement, we investigate the change in operating result/revenue over the entire period. The tables below show average and median values for the annual percentage point change over the entire period 2000-2005 for the group that received state aid and for the one that did not.

Percentage point change in Operating result/Revenue 2000-2005

Entire period	Average	Median
No state aid	0.029	0.044
State aid	0.003	0.023

Table 18. Total average and median percentage point change in Operating result/Revenue 2000-2005 for the two groups.

Annual percentage point change in Operating result/Revenue 2000-2005

Yearly average	Average	Median
No state aid	0.006	0.009
State aid	0.001	0.005

Table 19. Annual percentage point change in Operating result/Revenue 2000-2005, average and median for each of the two groups

By looking at the development over the entire period 2000-2005 and on a yearly average, we see that both the median and the average show that the airlines that did not receive state aid had a higher percentage point improvement than the ones that received state aid. We notice, however, that both groups improved their result, on average as well as median, over the period. The K-S test in table 20 tells us that we cannot reject the null hypothesis of equal distributions in the groups, and we hence use the M-W z-test to investigate differences in medians. The difference between the groups is not statistically significant, neither for the means nor for medians. As seen

in table 20, the t-statistics is -0.53 and the M-W z-statistics -0.39, indicating a relatively weak statistical significance, even given the small sample size.

Independent samples tests for equality of means and medians between state aid and no state aid groups

	Levene's test for eq. of variances		T-test for eq. of means		Z-tests for eq. of medians			
	F	Sig.	t	Sig. 2-tailed	M-W z	Exact Sig. 2-tailed	K-S z	Asymp. Sig. 2-tailed
Change in Operating result / Revenue 2000-2005	0.96	0.35	-0.53	0.61	-0.39	0.75	0.62	0.84

Table 20. T-tests and z-tests for equality in means and medians between companies that received state aid and the ones that did not.

To obtain performance measures that are comparable between the two groups across the years, we examine the average excess annual normalized operating result. For airlines that received state aid the average excess annual change in normalized operating result is calculated from the first year of state aid to the end of the period (2005), whereas for the airlines that did not receive state aid the same measure is calculated from the first year in financial distress to the end of the period.

Average annual change in excess Operating result/Revenue post event

Airline	State aid	Annual excess
Alitalia	x	0.003
Austrian		-0.098
Cyprus Airways	x	0.078
Olympic	x	-0.036
Malev	x	0.005
Air Malta	x	0.001
TAP		0.007
Sabena	x	0.004
LOT		0.002
Turkish Airlines		0.020
Aer Lingus		-0.001
Swiss	x	0.024
British Airways		0.009
Iberia		0.015

Table 21. Average excess annual change in normalized Operating result.

Average annual change in excess Operating result/Revenue post event

	Average	Median
No state aid	-0.006	0.007
State aid	0.011	0.004

Table 22. Average and median excess annual change in normalized Operating result for the two groups post event.

According to the median the airlines that did not receive state aid were improving their performance more in the years following financial distress than did the airlines that received state aid subsequently to the state aid. However, the average excess performance improvement of those that did not receive state aid is lower than for the airlines that received state aid. The average for the group that did not receive state aid is largely impacted by the fact that Austrian has the by far largest negative annual average. The K-S z-statistics indicates that we cannot reject that the distribution of the state aid group is equal to the no state aid group, and we can hence use the M-W z-statistics to test for equality of medians in the two groups. None of the differences in means and medians between the two groups are shown to be statistically significant at the 5% level. Given t-statistics of -0.19 and a M-W z-statistics of -0.65, we conclude that the differences between the groups are relatively far from being statistically significant.

Independent samples tests for equality of means and medians between state aid and no state aid groups

	Levene's test for eq. of variances		T-test for eq. of means		Z-tests for eq. of medians			
	F	Sig.	t	Sig. 2-tailed	M-W z	Exact Sig. 2-tailed	K-S z	Asymp. Sig. 2-tailed
Change in Excess operating result / Revenue Post event	0.84	0.38	-0.19	0.85	-0.65	0.57	0.85	0.47

Table 23. T-tests and z-tests for equality in means and medians between companies that received state aid and the ones that did not.

The findings from this section are summarized in the following table.

Summary table Operating result/Revenue

	Levels	Improvement entire period	Improvement post state aid
Median	N	N	N
Average	N	N	S

Table 24. The group of airlines not receiving state aid (N) outperformed the group receiving state aid (S) in five of six measures.

Table 24 shows that the group of airlines that did not receive state aid had an overall better performance and a better performance improvement than the ones that received it. This is true both during the years following the financial distress/state aid and over the entire period. The only exception is the average improvement post state aid, where

the no state aid group is pulled down by the large negative value of Austrian. None of these differences are statistically significant at the 5% level. However, given the small sample size, the t-values for operating result/revenue levels in 2002 and 2003 as well as M-W z-values for 2002, 2003 and 2004, indicate that the statistical significance is relatively strong. Hence, the airlines that received state aid performed worse in these years. Also, for most years, the difference in operating result/revenue levels between the two groups is strongly economically significant. For the improvement over the years, over the entire period as well as post financial distress/state aid, the statistical as well as the economic significance is weaker.

6.4.2 Labour cost income generation

The following tables show revenue, operating result, net income and operating cost in relation to labour cost for the group receiving state aid as well as for the group not receiving state aid.

Yearly averages of ratios related to Labour cost – State aid group

Average levels, state aid	2005	2004	2003	2002	2001	2000
Revenue/Labour cost	496%	469%	473%	496%	483%	470%
Operating result/Labour cost	-1%	-11%	-25%	-16%	-11%	-10%
Net income/Labour cost	-12%	-26%	-36%	-24%	-44%	-30%
Labour cost/Operating costs	21%	22%	21%	22%	21%	23%

Table 25. Average measures for all airlines that received state aid

Yearly averages of ratios related to Labour cost – No state aid group

Average levels, no state aid	2005	2004	2003	2002	2001	2000
Revenue/Labour cost	733%	429%	440%	789%	542%	524%
Operating result/Labour cost	31%	14%	27%	39%	-4%	19%
Net income/Labour cost	20%	8%	11%	23%	-55%	11%
Labour cost/Operating costs	23%	26%	26%	22%	20%	38%

Table 26. Average measures for all airlines that did not receive state aid.

Yearly medians of ratios related to Labour cost – State aid group

Median levels, state aid	2005	2004	2003	2002	2001	2000
Revenue/Labour cost	494%	448%	426%	444%	453%	462%
Operating result/Labour cost	-6%	-12%	-27%	-5%	-5%	-6%
Net income/Labour cost	-11%	-20%	-38%	-9%	-48%	-22%
Labour cost/Operating costs	20%	22%	22%	22%	21%	22%

Table 27. Median measures for all airlines that received state aid

Yearly medians of ratios related to Labour cost – No state aid group

Median levels, no state aid	2005	2004	2003	2002	2001	2000
Revenue/Labour cost	418%	369%	368%	482%	410%	428%
Operating result/Labour cost	28%	18%	20%	17%	-4%	15%
Net income/Labour cost	22%	6%	8%	12%	-5%	15%
Labour cost/Operating costs	24%	28%	29%	22%	22%	23%

Table 28. Median measures for all airlines that did not receive state aid.

The median values indicate that the companies that received state aid generated more revenue per labour cost, but that companies that did not receive state aid generated more operating result and net income per unit of labour cost and had somewhat higher labour costs relative to total operating costs. The average indicates the same result for net income/labour cost, operating result/labour cost and labour cost/operating cost, but the opposite for revenue/labour cost. The difference in the last item is largely explained by the relatively high value for Turkish airlines, that increases the average of the no state aid group substantially. As seen from the tables above, the differences in averages and medians are economically important for operating result/labour cost and net income/labour cost, while smaller for the other two measures. While the group that received state aid showed negative operating result and net income in all the years, on average as well as median, the group that did not receive state only reported negative net income and operating result in 2001. The losses were economically substantial for the state aid group, whereas the gains for the no state aid group were important.

As seen in the table 29, K-S z-statistics show that we cannot, except in one case, reject equal distributions in the group that received state aid and the group that did not receive state aid. This means that we use the M-W z-test to check for equality of medians. In the table we see that only a few of the differences in means and medians between the airlines that received state aid and the ones that did not are statistically significant at the 5% level. It is only for net income/labour cost in 2000, 2002 and 2003 that t-statistics and M-W z-statistics indicate that the difference is statistically different from zero. The significance of the t-test suggests that companies that did not receive state aid reported a significantly higher net income/labour cost in these years. In 2000, the K-S z-statistics rejects equal distributions in the two groups, indicating that the significant result of the M-W z-test in this year only shows us that the distribution of ranks is different in the two groups, but that we cannot say anything

about the median. In 2003, the M-W z-test indicates that the median net income/labour cost is higher for the group that did not receive state aid. For 2004 and 2005 t-values for net income/labour cost are below -1.2, and M-W z-values are below -1.2 in 2004 and 2001, indicating that the no state aid companies outperformed the state aid companies in these years, however not as strongly as in 2000, 2002 and 2003.

For 2003, the t-statistics for revenue/labour cost is above 1.2, indicating, given the small sample size, that state aid companies performed better in that year. This is opposed by a M-W z-value of -1.46 that shows that state aid companies on median underperformed no state aid companies. This result seems contrainuitive, given that the difference in medians as given in table 27 and 28 indicate that the state aid group performed better. However, looking at the K-S z-statistics, we see that the significance is relatively high, and that we, given the small sample size, cannot say with certainty that the distribution of values in the state aid group is equal to the distribution in the no state aid group. This indicates that the M-W statistics rather indicates that the distribution of ranks differs between the groups.

For operating result/labour cost, z-values as well as t-values are below -1.2 in 2000, 2002 and 2003, indicating that no state aid companies outperformed state aid companies in this year. T-statistics for labour cost/operating cost are below -1.2 in 2004 and 2003, while M-W z-statistics are below -1.2 in 2004, 2003 and 2001. Once again, given the small sample size, these results show relatively strongly that companies that received state aid underperformed those that did not receive state aid.

Independent samples tests for equality of means and medians between state aid and no state aid groups

	Levene's test for eq. of variances		T-test for eq. of means		Z-tests for eq. of medians			
	F	Sig.	t	Sig. 2-tailed	M-W z	Exact Sig. 2-tailed	K-S z	Asymp. Sig. 2-tailed
Revenue/Labour cost 2005	2.48	0.14	-0.45	0.66	-1.17	0.28	1.10	0.18
Revenue/Labour cost 2004	0.46	0.51	1.16	0.27	-0.88	0.44	0.75	0.63
Revenue/Labour cost 2003	0.15	0.70	1.22	0.25	-1.46	0.17	1.10	0.18
Revenue/Labour cost 2002	2.04	0.18	-0.50	0.63	-0.88	0.44	0.88	0.43
Revenue/Labour cost 2001	1.02	0.34	0.05	0.96	-1.32	0.23	1.14	0.15
Revenue/Labour cost 2000	0.96	0.35	0.06	0.95	-0.57	0.65	0.68	0.74
Operating result/Labour cost 2005	1.93	0.19	-0.99	0.35	-0.88	0.44	0.75	0.63
Operating result/Labour cost 2004	0.08	0.78	-0.50	0.63	-0.73	0.52	0.96	0.31
Operating result/Labour cost 2003	0.00	0.97	-1.84	0.09	-1.61	0.13	0.96	0.31
Operating result/Labour cost 2002	0.02	0.88	-1.61	0.14	-1.87	0.07	1.22	0.10
Operating result/Labour cost 2001	1.18	0.31	-0.44	0.67	0.00	1.00	0.40	1.00
Operating result/Labour cost 2000	2.42	0.15	-1.72	0.12	-1.51	0.16	1.20	0.11
Net income/Labour cost 2005	2.66	0.13	-1.23	0.24	-1.02	0.35	0.88	0.43
Net income/Labour cost 2004	0.05	0.83	-1.39	0.19	-2.05	0.05	1.32	0.06
Net income/Labour cost 2003	2.16	0.17	-2.55	0.03	-2.34	0.02	1.32	0.06
Net income/Labour cost 2002	0.52	0.49	-2.32	0.04	-2.34	0.02	1.32	0.06
Net income/Labour cost 2001	1.05	0.33	-0.14	0.89	-1.51	0.16	0.97	0.31
Net income/Labour cost 2000	14.66	0.00	-4.70	0.00	-2.65	0.01	1.60	0.01
Labour cost/Operating cost 2005	6.51	0.03	-0.93	0.37	-1.02	0.35	1.10	0.18
Labour cost/Operating cost 2004	0.18	0.68	-1.49	0.17	-1.46	0.17	0.96	0.31
Labour cost/Operating cost 2003	1.54	0.24	-2.19	0.05	-1.90	0.07	1.32	0.06
Labour cost/Operating cost 2002	3.41	0.09	-0.62	0.55	-0.68	0.57	0.82	0.52
Labour cost/Operating cost 2001	2.79	0.13	-1.02	0.33	-1.32	0.23	0.91	0.38
Labour cost/Operating cost 2000	2.37	0.16	-0.84	0.42	-1.13	0.32	0.91	0.38

Table 29. T-tests and z-tests for equality in means and medians between companies that received state aid and the ones that did not.

Calculating the annual percentage point improvements in the different measures over the entire period, we obtain the results below.

Annual percentage point change in measures related to Labour cost 2000-2005

Annual percentage point change	Average No state aid	Average State aid	Median No state aid	Median State aid
Revenue/Labour cost	0.781	-0.015	-0.033	-0.009
Operating result/Labour cost	0.045	0.015	0.019	0.035
Net income/Labour cost	0.030	0.058	0.014	0.054
Labour cost/Operating costs	-0.031	0.000	0.006	-0.002

Table 30. Average and median annual percentage point change in the two groups.

From table 30 we conclude that the average airline that did not receive state aid improved revenue/labour cost and operating result/labour cost, as well as lowered labour cost/operating costs more than the average airline that received state aid. On the other hand, the average airline that received state aid improved net income/labour

cost more. In median terms, the group of companies that received state aid outperformed (higher increase or lower decrease) the group that did not receive state aid in all measures. The economic differences between the two groups are quite small. It is only for revenue/labour cost that we see a clear difference. In this measure, the state aid groups is on average as well as median worsening its result, while the no state aid group has a large improvement in average terms. However, in median terms, the no state aid group is worsening the result even more than the state aid group. The lower average, but higher median, for the state aid group is partly due to the considerable bad performance by Malev (received state aid). The lower average change in operating result/labour cost for the group that received state aid is partly explained by the large negative performance by Air Malta (received state aid). Finally TAP's exceptional decrease in labour cost/operating costs helps explaining why the average of airlines not receiving state aid is better than for the ones receiving it.

In the table below we see that none of the differences in means or medians between the two groups are statistically significant at the 5% level. However, we note that the t-statistics for net income/labour cost is 1.5, indicating, given the small sample, that state aid companies on average improved this measure more over the period. The K-S z-statistics for change in net income/labour cost shows a relatively high significance indicating, given the small sample size, that we cannot be sure that the distribution of values in the state aid group is equal to the distribution in the no state aid group. This indicates that the M-W z-statistics of -1.76 rather indicates that the distribution of ranks differs between the groups than that the median is not equal.

Independent samples tests for equality of means and medians between state aid and no state aid groups

	Levene's test for eq. of variances		T-test for eq. of means		Z-tests for eq. of medians			
	F	Sig.	t	Sig. 2-tailed	M-W z	Exact Sig. 2-tailed	K-S z	Asymp. Sig. 2-tailed
Change in Revenue/Labour cost 2000-2005	2.46	0.15	-0.64	0.53	-0.15	0.94	0.53	0.94
Change in Operating result/Labour cost 2000-2005	0.43	0.52	-0.09	0.93	-1.02	0.35	0.83	0.49
Change in Net income/Labour cost 2000-2005	0.01	0.92	1.50	0.16	-1.76	0.09	0.96	0.31
Change in Labour cost/Operating cost 2000-2005	2.63	0.13	0.64	0.54	-0.59	0.62	0.61	0.85

Table 31. T-tests and z-tests for equality in means and medians between companies that received state aid and the ones that did not.

The next step is to compare the post first year of state aid annual change in the measures for the group that received state aid with the post first year of financial distress performance for the group that did not receive state aid. We do this by calculating the annual excess change in the years after the state aid or financial distress. The results are presented below.

Average annual change in excess Revenue/Labour cost post event

Revenue/Labour cost	Average	Median
Not state aid	0.152	-0.551
State aid	-0.352	-0.079

Table 32. Average and median excess annual changes in Revenue/Labour cost for the two groups.

Studying the median, the airlines that received state aid had a better improvement in revenue/labour costs than the ones that did not receive state aid. The average shows, however, a better performance for the ones not receiving state aid. The difference in median and average can partly be explained by the very positive performance improvement by Turkish Airlines (that did not receive state aid).

Average annual change in excess Operating result/Labour cost post event

Operating result/Labour cost	Average	Median
Not state aid	-0.032	-0.001
State aid	0.039	0.018

Table 33. Average and median annual change in excess Operating result/Labour cost.

Both the median and the average show that the group of airlines that received state aid increased their operating result/labour cost more than the other group.

Average annual change in excess Net income/Labour cost post event

Net income/Labour cost	Average	Median
Not state aid	-0.044	-0.020
State aid	0.063	0.057

Table 34. Average and median annual change in excess Net income/Labour cost.

Both the median and the average show that the airlines that received state aid improved their net income/labour cost more than the group not receiving state aid.

Average annual change in excess Labour cost/Operating cost post event

Labour cost/Operating cost	Average	Median
Not state aid	-0.013	0.027
State aid	0.012	0.013

Table 35. Average and median annual change in excess Labour cost/Operating cost.

The median shows that the group that received state aid performed better in reducing labour cost as a share of total operating costs than the group that did not receive state aid. However, the average is better for the no state aid group. This can partly be explained by the fact that the far best improvement of the ratio, i.e. the most negative value, is presented by TAP (did not receive state aid).

In table 36 we first note that the K-S z-test cannot reject equal distributions in the groups, and we hence use M-W z-values to compare medians. We see that none of the differences in means and medians between the group that received state aid and the group that did not are statistically significant at the 5% level. Given our small sample, the M-W z-statistic of -1.61 for change in excess labour cost/operating cost post event still indicates that the median labour cost decreased more relative to the operating cost for the state aid group. All the other results are statistically weak.

Independent samples tests for equality of means and medians between state aid and no state aid groups

	Levene's test for eq. of variances		T-test for eq. of means		Z-tests for eq. of medians			
	F	Sig.	t	Sig. 2-tailed	M-W z	Exact Sig. 2-tailed	K-S z	Asymp. Sig. 2-tailed
Change in Excess revenue/Labour cost Post event	2.75	0.13	-0.03	0.97	-1.17	0.28	0.96	0.31
Change in Excess operating result/Labour cost Post event	1.63	0.23	0.23	0.82	-0.44	0.72	0.53	0.94
Change in Excess net income/Labour cost Post event	0.48	0.50	0.92	0.38	-1.02	0.35	0.88	0.43
Change in Excess labour cost/Operating cost Post event	2.07	0.18	0.33	0.75	-1.61	0.13	0.96	0.31

Table 36. T-tests and z-tests for equality in means and medians between companies that received state aid and the ones that did not.

In table 37 the qualitative results from section 6.4.2 are summarized.

Summary table of measures related to Labour cost

	Levels		Improvement entire period		Improvement post state aid	
	Median	Average	Median	Average	Median	Average
Revenue/Labour cost	S	N	S	N	S	N
Operating result/labour cost	N	N	S	N	S	S
Net income/labour cost	N	N	S	S	S	S
Labour cost/Operating costs	S	S	S	N	S	N

Table 37. Summary of the results of the Section 4.4.2

To summarize this section, the companies receiving state aid are inferior to the ones not receiving state aid in terms of levels of measures related to labour cost. However, they are improving some of the measures more per year than the companies that did not receive state aid. The only statistically significant differences in means and medians between the two groups are for net income/labour cost levels in 2000, 2002 and 2003, where the group not granted state aid outperforms the group that received state aid. We notice, however, that the economic significance in the differences in levels between the two groups is large for operating result/labour cost as well as for net income/labour cost. While the state aid group is consistently reporting losses in operating result as well as net income, the no state aid group is practically consistently reporting economically significant operating profits and net profits.

6.4.3 State aid, unemployment and investor protection rights

In this section we present the results from the empirical assessment of unemployment rates and investor protection rights in the countries where the airlines in the financially distressed sample have their headquarters.

In table 38, the average unemployment rates between 1995 and 2005 are presented for all countries where the financially distressed airlines have their headquarters. The countries where state aid was granted are shaded grey.

Average annual unemployment rates 1995-2005

Rank	Country	Unemployment (%)
1	Poland	16.11
2	Spain	13.07
3	Greece	10.33
4	Italy	9.80
5	Turkey	9.18
6	Belgium	8.38
7	Malta	7.35
8	Hungary	7.10
9	Ireland	6.67
10	United Kingdom	5.91
11	Portugal	5.87
12	Cyprus	4.37
13	Austria	4.25
14	Switzerland	3.12

Table 38. Yearly average unemployment rate (%) 1995 -2005 and ranks for all companies with airlines in financial distress. Grey shading indicates that the country has granted state aid.

Average and median annual unemployment rates for State aid and No state aid groups

	Average Unemployment	Median Unemployment
State aid	7.21	7.35
No state aid	8.72	6.67

Table 39. Average and median unemployment in percent for the two groups.

The table above indicates that state aid countries had a lower average unemployment but a higher median unemployment. Switzerland however, affects the average for the state aid group in a negative direction, while Poland and Spain raises the average of the no state aid group considerably. The difference between the two groups is economically very small, and we can hence not draw any conclusion as to which of the groups has higher unemployment.

Below, the World Bank investor protection index as well as the three indicators for investor protection rights from La Porta, Lopez-de-Silanes and Schleifer (2006) is presented for each of the countries where the financially distressed airlines have their headquarters. The World Bank index ranges from 0 to 10, while the other indices range between 0 and 1. Higher values indicate better investor protection.

Investor protection rights from World Bank index (2005) and La Porta, Lopez-de-Silanes and Shleifer (2006)

Country	WB Investor Protection	Disclosure Requirements	Liability Standards	Public Enforcement
Switzerland	3.0	0.67	0.44	0.33
Greece	3.0	0.33	0.50	0.32
Austria	3.7	0.25	0.11	0.17
Hungary	4.3	N/A	N/A	N/A
Spain	5.0	0.50	0.66	0.33
Italy	5.0	0.67	0.22	0.48
Turkey	5.3	0.50	0.22	0.63
Poland	6.0	N/A	N/A	N/A
Portugal	6.0	0.42	0.66	0.58
Belgium	7.0	0.42	0.44	0.15
United Kingdom	8.0	0.83	0.66	0.68
Ireland	8.3	0.67	0.44	0.37
Malta	N/A	N/A	N/A	N/A
Cyprus	N/A	N/A	N/A	N/A

Table 40. Strength of investor protection of the countries with airlines in financial distress. Grey shading indicates that the country has granted state aid.

Average investor protection rights for State aid and No state aid groups

Average	WB Investor Protection	Disclosure requirements	Liability Standards	Public Enforcement
State aid	4.5	0.5	0.4	0.3
No state aid	6.0	0.5	0.5	0.5

Table 41. Average investor protection for the two groups.

Median investor protection rights for State aid and No state aid groups

Median	WB Investor Protection	Disclosure requirements	Liability Standards	Public Enforcement
State aid	4.3	0.5	0.4	0.3
No state aid	6.0	0.5	0.6	0.5

Table 42. Median investor protection for the two groups.

From table 41 and 42, it is apparent that countries that gave state aid both on average and on median had lower World Bank investor protection rights. Also, the Public enforcement and the Liability standards indicate lower average and median investor protection for countries that granted state aid to their ailing airlines.

As seen in the K-S z-test in table 43 we cannot reject the null hypothesis of equal distributions in the state aid and the no state aid group, and we hence use the M-W z-statistics as a test for equal medians in the two groups. None of the differences in

means and medians between the groups are statistically significant on the 5% level. Due to the small sample size, t-statistics or M-W z-statistics inferior to -1.2 still indicate relatively strong statistical significance. The World Bank investor protection index and the public enforcement indicator both have t-values and M-W z-values inferior to -1.2, suggesting that countries that granted state aid to their ailing airlines in mean as well as median terms showed lower investor protection as measured by these indicators. The other measures show the expected directional differences, but the values are far from being significant.

Independent samples tests for equality of means and medians between state aid and no state aid groups

	Levene's test for eq. of variances		T-test for eq. of means		Z-tests for eq. of medians			
	F	Sig.	t	Sig. 2-tailed	M-W z	Exact Sig. 2-tailed	K-S z	Asymp. Sig. 2-tailed
Unemployment	2.10	0.17	-0.78	0.45	-0.19	0.90	0.53	0.94
World Bank Investor Protection	0.00	0.96	-1.64	0.13	-1.63	0.11	0.88	0.42
Disclosure Requirements	0.00	1.00	-0.05	0.96	-0.11	0.91	0.26	1.00
Liability Standard	3.44	0.10	-0.43	0.68	-0.55	0.61	0.77	0.59
Public Enforcement	2.61	0.14	-1.21	0.26	-1.39	0.17	0.77	0.59

Table 43. T-tests and z-tests for equality in means and medians between countries that granted state aid and countries that did not grant state aid.

From this section we conclude that there are no significant differences, neither statistical nor economic, in unemployment rates between the group that received state aid and the group that did not receive state aid. In terms of investor protection, two variables; the World Bank investor protection index and the La Porta, Lopez-de-Silanes and Shleifer (2006) public enforcement index, indicate that countries that granted state aid, according to the average as well as the median, had lower investor protection than the countries that did not grant state aid.

6.5 Analysis – state aid

6.5.1 Normalized operating result

From the empirical investigation of the companies that were in financial distress at some point between 2000 and 2005 we found that the group of financially distressed airlines that received state aid had a weaker operating result/revenue than the group that did not receive state aid. The results were economically significant, and given our small sample size the statistical significance was relatively strong, at least in 2002 and

2003. In all the sample years, the average as well as the median company in the state aid group had a negative operating performance. Since companies that report negative operating performance cannot cover their operating cost with their operating revenue, this indicates economic distress. Hence in these cases, the governments have supported companies that, before as well as subsequent to the state aid, operated under economic distress.

Studying the entire period and assessing the annual improvement in operating result/revenue, we find that companies that were not given state aid at any point during the period improved their performance in percentage points more than the group that did receive state aid. The average as well as the median of a company that was not given state aid was higher than the average as well as median of a company that was given state aid. This suggests that the governments supported companies that improved less over the period than did their peers that were not recipients of state aid. As explained earlier, the occurrence of negative starting values makes a comparison in percent rather than percentage points difficult. Such a comparison would be ideal, since it would help assessing whether the companies that were given state aid also improved their normalized operating performance less compared to their initial level. Given that they started from a lower level, this is a possibility that should not be disregarded.

Next, the yearly development in the years subsequent to the state aid for the companies that received state aid is compared to the yearly development in the years subsequent to the first year of financial distress for the companies that did not receive state aid. This measure gives qualitatively somewhat different results. While the median shows that the companies that received state aid performed worse, the average suggests the opposite. This means that it is possible that the companies that received state aid had a post-incident performance improvement that was better than the one of the companies that did not receive state aid, even if they performed worse in level terms during practically the entire period. There is however one observation in the group of companies that did not receive state aid that has a large negative impact on this group, namely Austrian, which showed the lowest excess annual change in normalized operating result of all financially distressed firms.

As seen in the empirical section none of the differences are statistically significant. This can, however, partly be explained by the small sample size, and the deviations could still be economically significant. This is the case for the level measures, where the economic differences between the two groups are substantial.

The conclusion is that either airlines that did not have a good financial structure, or that performed poorly, were granted state aid to stay in business, or otherwise airlines that received state aid performed worse than their peers. Due to our limited data set we cannot obtain a causal link between state aid and poor operating performance. However, as seen in the section on economic distress, state aid and economic distress are positively and strongly correlated in four of the six years in the sample period as well as over the sample period as a whole.

6.5.2 Labour cost income generation

Examining the main income statement measures relative to labour cost, the aim is to find out how efficiently labour was used in companies that received state aid and in companies that did not. The results from this part of the empirical analysis are ambiguous. For many of the measures the median and average values for the groups suggest different directions. Moreover, only three of the results are strongly statistically significant; Net income/labour cost levels in 2000, 2002 and 2003, where the group not granted state aid outperforms the group that received state aid. As stated earlier, the small sample size is one of the reasons for the absence of statistical significance. Two of the variables, operating result/labour cost and net income/labour cost levels, show large economic significance, with the state aid group reporting substantial losses on average and median and the no state aid group reporting profits in all years except one.

The level measures show that companies that did not receive state aid on average and median generated more operating profit and net income per unit of labour cost, but that their labour costs were higher relative to total operating costs. In terms of revenue generation per labour cost, the results are close, and the higher average for companies that did not receive state aid is highly influenced by the high value for Turkish airlines. One possible explanation could be that companies that receive state aid have

higher total operating costs relative to labour costs and they hence achieve lower operating results and net income than the group not receiving state aid.

In terms of improvement over the full period, net income generation increased most in the group of airlines that received state aid. The median results show that the companies receiving state aid also improved their generation of revenue and operating result per unit of labour cost more than the group not receiving state aid and decreased labour costs as a proportion of operating costs more. The average shows the opposite result for the three last variables, suggesting that companies that did not receive state aid improved their measures more.

For the periods following state aid payment (for the companies that received state aid) and for the periods following the first occurrence of financial distress (for the companies that did not receive state aid) the results are similar. The only qualitative difference is that companies that received state aid improved their operating performance/labour cost more than the companies that did not receive state aid also in average terms.

The overall result from this section is that the companies that received state aid used their labour less efficiently to generate operating result and net income, but that they had lower labour cost per unit of overall operating costs. In median terms the empirical analysis suggests that companies receiving state aid produced more revenue relative to their labour cost, while the average suggests the opposite. In terms of development over the period, the airlines that were given state aid improved their measures at least at the same speed as the companies that were not granted state aid. The fact that the operating performance per labour cost improved more in the state aid group suggests that the companies that received state aid generated better and better operating result relative to labour cost not only in absolute terms, but also that they increased their generation of operating result/labour cost relative to the financially distressed airlines that did not receive state aid. The results are similar for the full period and the post incident period.

6.5.3 State aid, unemployment and investor protection rights

Unemployment levels are neither statistically nor economically different between the group that received state aid and the group that did not. We hence do not find anything indicating that state aid is more likely to be given in countries where it would theoretically from a general equilibrium perspective be more efficient than in other countries. Since unemployment is a proxy for the cost of liquidation of an airline to society, we expected unemployment to be higher in state aid countries. That is, we would expect countries to be more inclined to give state aid when the alternative use of the employees is lower, and hence where the cost of loosing a major national employer is higher. Even if the findings would have been significant it would not have produced any evidence regarding the efficiency of state aid.

The ranking of the countries according to the strength of the World Bank investor protection index shows that all the countries that granted state aid, except for Belgium, are in the half of the countries with weaker investor protection whereas the countries that did not give state aid are in the half of the countries with stronger investor protection. The median as well as the average World Bank investor protection index indicates lower investor protection for the group that granted state aid. Based on the indicators for investor protection in La Porta, Lopez-de-Silanes and Shleifer (2006) we also investigate whether the disclosure requirements index, the index of liability standards, and the index of public enforcement differ between the two groups. For the liability standards and the public enforcement index, we see that companies that received state aid had lower average and median index values. For the World Bank index and the La Porta et al. Index for public enforcement the differences in means and medians are relatively strong statistically. These findings suggest that state aid is more likely to be given in countries where investor protection is low and where it would theoretically be more efficient from a general equilibrium perspective than in the other countries. This tendency is in line with the findings of Gennaioli and Rossi (2006); when legal protection against tunnelling is weak the only feasible debt structure consists of standard foreclosure rights, i.e. state intervention. Our result does still not allow us to conclude whether state intervention is efficient or not.

7. Conclusion

This study documents the severity of the financial difficulties among European airlines between the year 2000 and 2005. Out of the 28 AEA members investigated, 14 were assessed as financially distressed, and of these financially distressed airlines 11 were shown to experience economic distress at some point during the period. The correlation between financial and economic distress was large and statistically significant in each of the years as well as over the full sample period. These results indicate that the AEA airlines had difficulties in serving their debt, and that they could not cover their operating costs with their operating revenues.

We also find that, in Europe, a frequently used method to help ailing airlines is to grant state aid. Seven of the European airlines received state aid in response to bankruptcy threat between 2000 and 2005. From our empirical assessment we found that these airlines did on average show operating losses in the period prior to as well as subsequent to the subsidy, and that they showed lower operating result/revenue than their peers that did not receive state aid. The differences between the two groups were economically significant. Moreover, the annual improvement in normalized operating result was lower for the companies that received state aid. This is true for the whole period as well as when the performance subsequent to the first year of state aid for the companies that received state aid was compared to the performance of the airlines that did not receive state aid subsequent to their first year in financial distress. However, not strongly statistically significant due to our small sample size, these findings suggest that the state aid was not economically efficient in the sense that it was granted to companies that continued showing signs of economic distress. Also, the correlation between state aid and economic distress was positive and statistically significant in 2003, 2004 and 2005 as well as for the entire period. An alternative interpretation of the result would be that companies that were given state aid were worse off from the beginning. Since the airlines that were granted state aid continued improving their performance less rapidly than their peers, the government subsidies did not help the companies achieving operating results in level with the other financially distressed airlines. This finding is in line with Stigler's (1971) theory on regulatory capture. According to his general hypothesis, every industry or occupation that has enough political power will use the state to control entry and reduce the rate

of growth of new firms. One way is a direct subsidy of money.⁵¹ Thus airlines may for example seek subsidies for the own company or the airports.⁵²

On the other hand, in the assessment of labour cost relative to a few selected income statement measures we found that the efficiency at which labour generated operating results increased more for the companies that received state aid in the post incident period than for the group that did not receive state aid. This suggests that, even though airlines that received state aid did not operate as efficiently as those that did not receive state aid and improved their operating performance less, the most important cost item increased its generation of operating result more than for the companies that were not granted state aid. However, none of the differences, apart from net income/labour cost levels, where the no state aid group showed a better result in 2000, 2002 and 2003, were strongly statistically significant.

We did not find economically or statistically large differences in unemployment rates between the group of airlines that received state aid and the group that did not receive state aid. On the other hand, the World Bank investor protection rights index as well as the La Porta, Lopez-de-Silanes and Shleifer (2006) indices for liability standards and public enforcement showed that countries that granted state aid to their troubled airlines generally had a lower level of investor protection. However not significant on the 5% level due to our small sample size, the results suggest that state aid was more likely to be granted in cases where it was more efficient from a general equilibrium point of view than in the countries where it was less efficient.

⁵¹ Stigler (1971), p.4

⁵² Ibid p.5

References

Adria Airways, Annual reports 2000-2005

Aer Lingus, Annual reports 2000-2005

Air France, Annual reports 2000-2004

Air France-KLM, Annual report 2005

Air Malta, Annual reports 2000-2005

Alitalia, Annual reports 2000-2005

Andrade, G and Kaplan, S, (1998) *How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed*, Journal of Finance Vol LIII No 5 October 1998

Asquith, P, Gertner, R & Scharfstein (1994), *Anatomy of financial distress: An Examination of junk bond issuers*, Quarterly Journal of Economics, Aug 94, Vol. 109 Issue 3, pp.625-659

AEA Yearbook (2001), Association of European Airlines, www.aea.be
Retrieved 25.05.2007

AEA Yearbook (2002), Association of European Airlines, www.aea.be
Retrieved 25.05.2007

AEA Yearbook (2003), Association of European Airlines, www.aea.be
Retrieved 25.05.2007

AEA Yearbook (2004), Association of European Airlines, www.aea.be
Retrieved 25.05.2007

AEA Yearbook (2005), Association of European Airlines, www.aea.be
Retrieved 25.05.2007

AEA Yearbook (2006), Association of European Airlines, www.aea.be
Retrieved 25.05.2007

Association of European Airlines, Presentation
http://www.aea.be/AEAWebsite/Presentation_Tier/Pr_AboutUs.aspx
Retrieved 25.05.2007

Austrian, Annual reports 2000-2005

Baird, D (1990), *Revisiting Auctions in Chapter 11*, Journal of Law and Economics, Vol 36 No 1 Part 2 1993, pp.633-653

BMI, Annual reports 2000-2005

Borenstein, S and Rose, N (1995a), *Do airlines in Chapter 11 harm their rivals? Bankruptcy and pricing behavior in U.S. Airline markets*, NBER Working Paper Series, No. 5047, National Bureau of Economic Research, Cambridge MA, Feb 1995

Borenstein, S and Rose, N (1995b), *Bankruptcy and pricing behavior in US airline markets*, American Economic Review, May 95, Vol.85 Issue 2, pp.397-403

British Airways, Annual reports 2000-2005

Cargolux, Company Presentation
<http://www.cargolux.com/company/presentation.php>
Retrieved 25.05.2007

Croatia Airlines, Annual reports 2000-2005

Cyprus Airways, Annual reports 2000-2005

Czech Airlines, Annual reports 2000-2005

Datastream

Djankov, Simeon, Olivier D. Hart, McLiesh C, Shleifer A, (2006), *Debt enforcement around the world*, Working Paper, Harvard University

Doganis, R. (2006), *The Airline Business*, Routledge 2006

Enz, M (2001), *Das Fiasko der Swissair in der Retrospektiva. Der EWR, der Kauf der Sabena und die gescheiterte Expansionstrategie*, Neue Zürcher Zeitung, April 23rd 2001, <http://www.nzz.ch/dossiers/2001/swissair/2001.04.23-wi-article7CHHQ.html>

Finnair, Annual reports 2000-2005

Frenken (2003), *Airline Competition at European Airports*, Utrecht University, Nov 2003, Tijdschrift voor Economische en Sociale Geografie 2004 Vol. 95 No.2 pp.233-242

Gennaioli, N and Rossi, S (2006), *Optimal Resolutions of Financial Distress by Contract*, IIES Stockholm University and Stockholm School of Economics, December 2006

Gilson S, John K, Lang L (1990), *Troubled debt restructurings An empirical study of private reorganization of firms in default*, Journal of Financial Economics, Oct. 1990, Vol 27 Issue 2, pp 315-353

Graphpad Software
http://www.graphpad.com/help/Prism5/prism5help.html?checklist_mannwhitney.htm
Retrieved 25.05.2007

Iberia, Annual reports 2000-2005

Icelandair, Annual reports 2000-2005

Jackson, T.H, (1986), *The logic and limits to bankruptcy*, Boston: Little, Brown and Company

Knorr, A and Arndt A, (2003), *Swissair's collapse – an economics analysis*, Universität Bremen, September 2003

Koller, T, Goedhart, M, and Wessels, D (2005), *Valuation. Measuring and managing the value of companies*, 4th edition, John Wiley & Sons, 2005

Lerner, J, and Schoar A (2005) *Does legal enforcement affect financial transactions? The contractual channel in private equity*, Quarterly Journal of Economics 120, pp.223-246

Littorin, H, Responsible for market and business analysis at Luftfartsverket/LFV Group Swedish Airports and Air Navigation Society, Interview conducted November 24th, 2006

LOT, Annual reports 2000-2005

Lufthansa, Annual reports 2000-2005

Luxair, Annual reports 2000-2005

Malev, Annual reports 2000-2005

Meridiana, Annual reports 2000-2005

Moser, S (2001) *Bruchlandung. Wie die Swissair zugrunde gerichtet wurde*, 4th Edition, Zurich

Neue Zürcher Zeitung (2003), *Die Swiss 2002 mit einem Milliardenverlust*, March 15th, 2003
<http://www.nzz.ch/2003/03/15/wi/page-article8QKR6.html>

Porta, R, Lopez-de-Silanes, F, Shleifer, A (2006), *What works in securities laws?*, The Journal of Economics, Vol LXI No.1, Feb 2006

Pulvino, T (1998), *Do asset fire sales exist? An empirical investigation of commercial aircraft transactions*, Journal of Finance, Jun 98, Vol.53 Issue 3, pp.939-979

Qian, J and Strahan, P.E. (2006), *How law and institutions shape financial contracts: the case of bank loans*, Working Papers, Financial Institutions Centre at the Wharton School 2005, pp.1-43

Richter, P (2001), *Collapse of Sabena heralds drastic outside European airline industry*

<http://www.wsws.org/articles/2001/nov2001/sabe-n22.shtml>

Retrieved 25.05.2007

SAS, Annual reports 2000-2005

Schwartz, A. (2005) *A Normative theory of Business Bankruptcy*, Yale University, August 2005

Shleifer, A. and Vishny R.W (1997), *A Survey of Corporate governance*, Journal of Finance 52, pp.737-783

SN Brussels Airlines, Annual reports 2003-2005

Stigler, G.J, (1971), *The Theory of Economic Regulation*, The Bell Journal of Economics and Management Science Vol.2, No.1, Spring 1971 pp.3-21

Swiss/Swissair, Annual reports 2000-2005

Media Release on the 2005 annual results: *SWISS substantially improves its annual EBIT result*, www.swiss.com

Retrieved 25.05.2007

TAP Portugal, Annual reports 2000-2005

Turkish Airlines, Annual reports 2000-2005

Doing Business Database (2006), *Doing Business in 2007*, The World Bank and International Finance Corporation, 2006

<http://caliban.worldbank.catchword.org/vl=1066735/cl=45/nw=1/fm=docpdf/rpsv/bk/wb/9780821364888/v1n1/s1/p1>

Retrieved 25.05.2007

Appendix A – Companies that received state aid

Alitalia

Over the past decade, Alitalia has been helped out by the Italian government on several occasions. Some of the bailouts have been judged by the European commission as state aid, while others have not. For the purpose of this essay, we will consider them all state aid.

In June 2002 the head office of the European Union approved a 1.43 billion Euro recovery plan for Alitalia. The involvement of private investors in addition to the Italian government meant that the government part in the plan was not considered state aid.⁵³ Two years later, in May 2004, the Italian deputy prime minister, Gianfranco Fini, said that “Alitalia is in a very serious financial position and without urgent intervention it risks collapsing”.⁵⁴ Almost three month later, in July, Alitalia got EU approval for a 400 million Euro emergency loan guaranteed by the state.⁵⁵ In the end of 2005 and beginning of 2006, Alitalia raised 1 billion in a rights issue. More than half of the money was raised from private financial institutions, while the rest was provided by the Italian government. The rights issue reduced the government stake from 62% to below 50% and was the base of a new restructuring plan.⁵⁶

Olympic Airlines

The Greek national carrier, Olympic Airlines, has been granted illegal state aid of about 700 million Euros from 1998 to present. An EU decision has judged that 41 million Euros in illegal restructuring aid and 120 million Euros in operation aid, for example waivers of value-added taxes on fuel and airport charges, were given to the company between 1998 and 2002. The European commission has also ruled that 540 million of illegal state aid has been given to Olympic Airlines after 2002. The aid mainly refers to the split of Olympic in 2003 into a service company that took on all the debt, and a carrier that was debt-free.⁵⁷

⁵³ AP Online, 19 June 2002

⁵⁴ Sunday Business, 2 May 2004

⁵⁵ Reuters News, 20 July 2004

⁵⁶ The Wall Street Journal Europe, January 2006

⁵⁷ Reuters News, 26 October 2006

Malev

In 2001, the Hungarian flag carrier was granted Ft 9.2 billion in state aid and Ft23 billion in state loans in order to help the carrier reduce the 2001 loss and reorganize to break even in 2002.⁵⁸ Once again, in December 2003, the Hungarian government gave the carrier a Ft7 billion capital injection, with a promise of more funds if the carrier succeeds in restructuring the company.⁵⁹ In December 2004, the government decided not to grant the company another Ft 3 billion, but rather to allow an increase of the undervalued assets of the company from Ft 2.6 billion to Ft 3.5 billion. The decision was an effort to “save the taxpayer’s money”.⁶⁰

Air Malta

In 2003, shortly before Malta joined the European Union in May 2004, the Maltese government carried out a recapitalization amounting to USD 72.9 million for restructuring of the company as part of a rescue plan.⁶¹

Cyprus Airways

In 2005, the European Commission approved CYP 30 million in emergency state aid to Cyprus Airways.⁶²

Swiss

After the grounding of the Swissair fleet in October 2001, the Swiss government granted a 292 million Euro bridge loan to the ailing carrier in order to avoid a permanent grounding of Swissair and to make a reallocation of jobs and assets to a new national carrier.⁶³

Sabena

After the collapse of Swissair in October 2001, Sabena got a bridging loan of 125 million euros from the Belgian state and it was granted respite from creditors for one month.⁶⁴

⁵⁸ Financial Times, 11 October 2001

⁵⁹ Aviation Daily, 12 December 2003

⁶⁰ MTI-Eco News, 17 December 2004

⁶¹ Air Transport World, November 2004

⁶² Financial Times, 5 May 2005

⁶³ Zurkinden and Scholten

⁶⁴ Richter 2001

Appendix B – Companies that went into actual bankruptcy

Swiss

In April 2001 SAirGroup announced a loss of 1.86 billion Euro for the year 2000. Most of it was due to full consolidation of actual and imminent losses from the group's interests in other airlines.⁶⁵ On October 2nd 2001, the entire Swissair fleet was grounded because of the insolvency of its parent company the SAirGroup. Two days later Swissair and some of its subsidiaries were forced into Chapter 11-like "Nachlassstundung" to seek protection from its creditors. The Swiss government almost immediately granted an emergency bridge loan of 292 million Euro in order to avoid a permanent grounding of Swissair and to make a reallocation of as many jobs and assets as possible to a new national carrier possible. The government provided an additional loan as the restructuring process took longer than expected (1 billion Euro). In total the Swiss Federal government, the Cantonal governments and private investors including UBS, Credit Suisse and most major Swiss companies spent 2.75 billion Euro to replace SAirGroup by a new national carrier: Swiss. The new company was built around the Crossair fleet and began operations on March 31st 2002.⁶⁶ However, its first year in business Swiss made a total loss of CHF 658 million⁶⁷. The takeover by Lufthansa was announced March 22, 2005. On January 27th 2006 the Swiss share was delisted from the SWX Swiss Exchange.⁶⁸

Sabena

Sabena has only presented a profit twice throughout its 78 year history (in 1958 and in 1999)⁶⁹. It was financially supported by the Belgian state on a continual basis. However Belgium's national debt put an increased pressure on Sabena. Under the treaty of Maastricht the European states set restrictive limits of their indebtedness: Belgium's debt amounted to 140% of its GDP and the government had to undertake considerable measures to improve the situation. Among these was the privatization of

⁶⁵ Knorr and Arndt (2003)

⁶⁶ Knorr and Arndt (2003)

⁶⁷ Neue Zürcher Zeitung (2003)

⁶⁸ Media Release on the 2005 annual results: SWISS substantially improves its annual EBIT result

⁶⁹ Enz (2001), Moser (2001)

state owned companies: Sabena was privatized. The management tried to cut costs during the 1990s but there were many strikes preventing it. In May 1995 49.5% of Sabena was sold to Swissair and it became a part of the Swissair led Qualifyer alliance. After the collapse of Swissair in October 2001, Sabena got a bridging loan of 125 million Euros from the Belgian state and it was granted respite from creditors for one month. The condition was that Sabena would find a new investor within this period who would continue managing the company. The Belgian government refused to assume any more responsibility for the company. No investor was found.⁷⁰ On 7 November 2001, one month after Swissair was grounded, Sabena had to file for bankruptcy.⁷¹ Sabena followed the example of the Swissair-Crossair solution and was dissolved into its own subsidiary, the cheap flight carrier Delta Air Transport that took over the company.⁷² SN Brussels Airlines was the trading name of Delta Air Transport. The company has merged with Virgin Express and is being phased out and replaced by Brussels Airlines, which was bound to start operations on March 25 2007.

⁷⁰ Richter (2001)

⁷¹ Knorr Arndt (2003)

⁷² Richter (2001)