

**Company Survival
Following Rescue
and Restructuring
State Aid**

Working Paper

Ref: 2005-01

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Abstract

We study the survival of companies having received rescue or restructuring State aid in the EU. Our analysis is based on a newly constructed dataset on the awards of State aid that were approved individually by the Commission between 1995 and 2003. We first provide a descriptive analysis of the companies that received the aid, of the aid awarded and of the mortality of aided firms. We then present a regression analysis that determines the influence of various factors, such as the type of aid and market conditions, on the subsequent survival of aid-receiving companies. We find high mortality among companies who received rescue aid. The amount of State aid and the availability of other aid instruments seem to have no impact on survival. Thirdly, we find evidence that if a company was in difficulty because of market decline or poor management, such company would be more likely to survive after receiving rescue or restructuring aid.

1 Introduction

According to the current European Union State aid guidelines, rescue and restructuring State aid (i.e. government subsidies) given to enterprises in difficulty, e.g. enterprises that face bankruptcy or need to restructure, is compatible with the European Union's State aid regime only under strict conditions¹. Such conditions are necessary because the provision of State aid to failing enterprises shifts the burden of structural change to unaided firms and, as such, distorts the level playing field between firms in the same industrial sector.

The fundamental aim of rescue and restructuring State aid is to assist firms in difficulty² to overcome their problems and become viable again. Such aid is viewed as legitimate because “... *there are circumstances in which State aid for rescuing firms in difficulty and helping them to restructure may be justified. It may be warranted, for instance, by social or regional policy considerations, by the desirability of maintaining a competitive market structure when the disappearance of firms could lead to a monopoly or tight oligopoly situation, and by the special needs and wider economic benefits of the small and medium-sized enterprise (SME) sector*”.³

Despite the large number of rescue and restructuring State aid interventions in Europe⁴, little is known on the effectiveness of such aid⁵. Using a newly available dataset, we are able to document for the first time the survival of companies that have benefited from rescue and restructuring State aid⁶. This allows us to make

¹ For example, rescue aid can be provided exceptionally and is authorised for periods longer than six months. It is not authorised if it is merely intended to maintain the status quo. Moreover, rescue State aid must consist of liquidity support in the form of loan guarantees or loans bearing normal commercial interest rates while a wider range of aids are allowed for restructuring State aid. Restructuring aid is governed by the “one time, last time” condition, i.e. it may be granted only once.

² According to the Community Guidelines on State aid for rescuing and restructuring firms in difficulty, *Official Journal of the European Communities* C288/2, 9.10.1999: “A firm in difficulty is one unable, through its own resources and without outside intervention by the public authorities, to stem losses which will almost certainly condemn it to go out of business in the short or medium term.”

³ *Official Journal of the European Communities* C288/2, 9.10.1999

⁴ Total State aid (excluding aid to agriculture, fisheries and railways) granted by the fifteen Member States was estimated at Euro 37.3 billion in 2003 or 0.40% of EU15 Gross Domestic Product (GDP). (European Commission, 2005).

⁵ R&D State aid is the only type of State aid that has received a fair degree of attention in the literature. For example, an evaluation of R&D State aid in the Netherlands concludes that, for every €1 provided by public authorities in State aid, the aid-receiving firms have spent an additional €1.04 (Ministry of Economic Affairs, Netherlands, 2000). Other studies finding generally a positive impact of R&D State aid in EU Member States include the following: Belgium (Holemans and Sleuwaegen, 1988), Germany (service sector, Czarnitzki and Fier, 2002), Italy (Antonelli, 1989), Norway (Klette and Moen, 1997), Spain (Busom, 2000) and the OECD countries (Guellec and van Pottelsberghe de la Potterie, 1997). The generally positive findings from Europe stand in sharp contrast to those of Lichtenberg (1984, 1987 and 1988) who finds evidence of crowding out in the U.S.A. Similarly, Mamuneas and Nadiri (1996) find that publicly funded R&D may crowd out privately-funded R&D, especially in the low-tech sectors.

⁶ Some authors study the impact of State aid on productivity. As a more productive company has a better chance of survival, these studies could be interpreted as providing indirect evidence on the impact of State aid on survival. For example, Bergström (1998a, 1998b, 1998c) finds that, in the case of Sweden, regional capital subsidies boost the aid-receiving firms' productivity in the first year after the receipt of the subsidy and that thereafter the productivity performance of the State-aid receiving firms deteriorates. In the case of Northern Ireland (Harris and Trainor, 2005) find that the financial subsidies provided to manufacturing firms had a positive and large

several contributions to the existing literature on the effectiveness of government assistance to business.

First, our study provides extensive summary statistics on the entire population of rescue and restructuring State aid cases that have been approved by the Commission over the period 1995-2003.

Second, we compute mortality and survival rates among rescue and restructuring aid-receiving companies.

Third, we explore the determinants of survival of aid-receiving companies. In this context, we examine which features of the rescue and restructuring State aid packages improve the probability of survival. Among the various aid package characteristics that we consider are the type of aid, (rescue vs. restructuring), the financial instrument used to provide the aid (loan, guarantees, etc) and the amount of State aid. We also examine whether the types of the difficulties faced by the aid-receiving firm affect the probability of survival.

The remainder of the article is organised as follows. Section II describes our data sources. In section III we present some descriptive statistics about the rescue and restructuring State aid-receiving companies in our sample, and the rescue and restructuring State aid packages that they received. In section IV we analyse the survival rates of the rescue and restructuring State aid-receiving companies. In section V we present an econometric analysis of the determinants of survival among those companies having received rescue and /or restructuring aid. Section VI concludes.

impact on the level manufacturing production and that capital grants were more likely to have a positive impact on TFP than other forms of financial assistance.

2 Data Sources

The population of rescue and restructuring State aid cases considered in our study includes all the rescue and restructuring State aid cases that were approved by the European Commission over the period 1995-2003. A brief description of the State aid cases is provided in Table 1. In total, 86 rescue and restructuring State aid cases⁷ were approved over the period 1995-2003. Of these 86 cases, we excluded 9 from our analysis because the period of aid reimbursement (for rescue aid cases) or the implementation of the restructuring plan had not yet come to an end by 2003.

The 77 rescue and restructuring State aid cases covers a smaller number of aid-receiving companies as a number of companies benefited from multiple awards of such aid. Four companies received both rescue and restructuring State aid, one company received twice rescue State aid and one company received twice restructuring⁸ State aid. Thus, in our sample, there were 71 individual companies that received rescue and/or restructuring State aid.

Table 1: Summary of State Aid Cases in Sample

Total number of rescue and restructuring State aid cases approved from 1995 to 2003	86
Number of rescue and restructuring State aid cases that have ended, i.e. the aid has been repaid or the restructuring plans have come to an end	77
Number of companies having benefited from rescue and restructuring State aid cases where the aid has been repaid or the restructuring plans have come to an end	71

Source: *London Economics*

For each aid-receiving company we collected information on the following:

Company characteristics: national and regional location of the company, noting in particular whether these businesses were in assisted areas; primary industrial sectors of business activities; information on main competitors; year of foundation; year difficulties started, the causes and duration of the business difficulties; the company status in 2003; and employment, turnover and profit of the company at the time of the aid first being given and in 2003 (if applicable).

Aid characteristics: type of aid (rescue or restructuring); value of the aid, start year and duration of disbursement; focus of aid towards specific location

⁷ Between 1990 and 2002, the European Commission approved about 120 rescue and restructuring State aid cases.

⁸ This is contrary to the “one time, last time” rule, but such a situation arose because, initially, the second case was considered to concern only a subsidiary of the parent company rather than the whole company.

or product within company; financial instruments used to provide the State aid; and the anticipated use of the aid (purely financial support or structural changes); (if applicable): start and duration of restructuring process and, where available, details of measures undertaken with a quantification of the restructuring measures (for example, reduction in number of employees).

In addition to relying on the information provided in the rescue and restructuring State aid case documentation, we used a number of additional sources to gather all the information necessary for our analysis. For listed companies, the financial information service Bloomberg Professional⁹ provided most of the information we required. However, in the case of unlisted companies we had to rely on a wide range of information sources including the various company information databanks available in LexisNexis¹⁰, company annual reports, company web sites, press articles, and official bankruptcy registers. The sectoral data that we use in our regressions were obtained from the OECD STAN dataset¹¹.

The regression sample consists of all State aid approvals, over the period 1995-2003, for which we were able to retrieve all the necessary information to estimate the model, which left us with a sample of 63 observations.

⁹ <http://about.bloomberg.com/about/professional/index.html>

¹⁰ http://business.lexisnexis.co.uk/page_63.html

¹¹ <http://www.oecdwash.org/PUBS/ELECTRONIC/SAMPLES/stan2002-guide.pdf>

3 Key Characteristics of Rescue and Restructuring State Aid Cases

In this section, we provide an overview of the distribution of the rescue and restructuring State aid by type of aid, aid-granting EU Member States, sectors and size of companies. We also present information, as recorded in the State aid decisions or background material, on the business difficulties encountered by the aid-receiving companies, the type of financial instrument used to provide the aid and the key elements of the restructuring to be undertaken by the aid-receiving companies.

Distribution of rescue and restructuring State aid cases by type of aid

Restructuring aid was slightly more common than rescue aid among the 86 cases of approved rescue and restructuring State aid. Table 2 shows the split between rescue and restructuring State aid for each of the categories detailed in Table 1.

Table 2: Number of State Aid Cases by Type of Aid Over 1995-2003

Type of Aid	All cases	Cases where rescue/restructuring aid had ended by 2003	Number of individual companies benefiting from the State aid
Rescue	34	34	29
Restructuring	52	43	42
Total	86	77	71

NOTE: the four companies that received both rescue and restructuring aid were included in the group of companies having received restructuring aid.

Source: London Economics

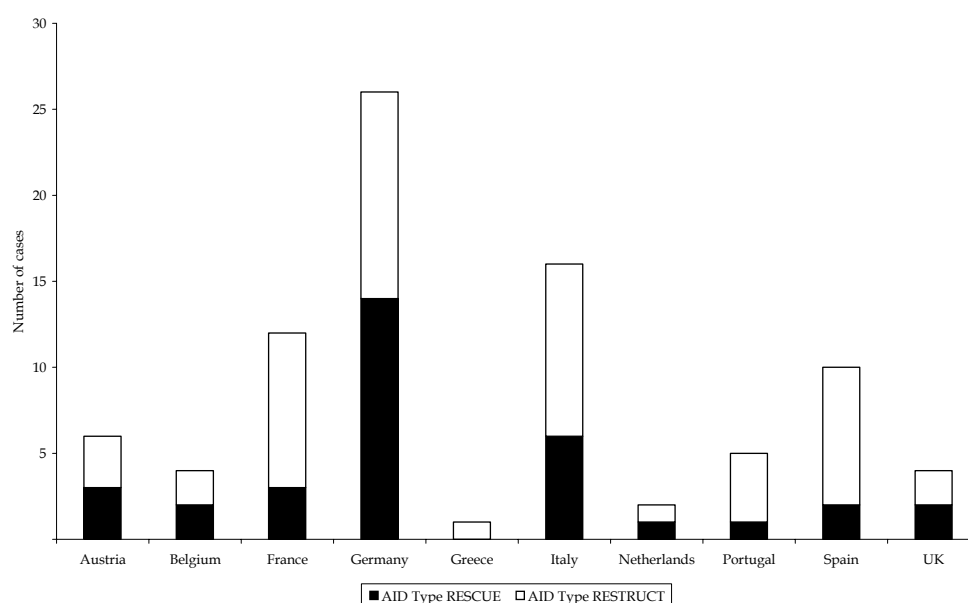
Geographical distribution of the rescue and restructuring State aid cases

The geographical distribution of these State aid cases is shown in Figure 1. The rescue and restructuring State aid cases of the period 1995 to 2003 involved ten Member States. Germany and Italy generated the largest number of approved rescue and restructuring State aid cases over the 1995 to 2002 period. Austria, France and Spain form a second tier of countries with a relatively large number of rescue and restructuring State aid cases, while the other EU Member States generated relatively few or no cases.

The balance between restructuring and rescue State aid cases differed across countries. Restructuring aid was more common than rescue aid in several of the

Member States (France, Greece, Italy, Portugal and Spain). In the other countries the number of rescue and restructuring State aid cases were broadly equal.

Figure 1: Geographical Distribution of Rescue and Restructuring State Aid Cases by Type of State Aid, 1995-2003



Source: *London Economics*

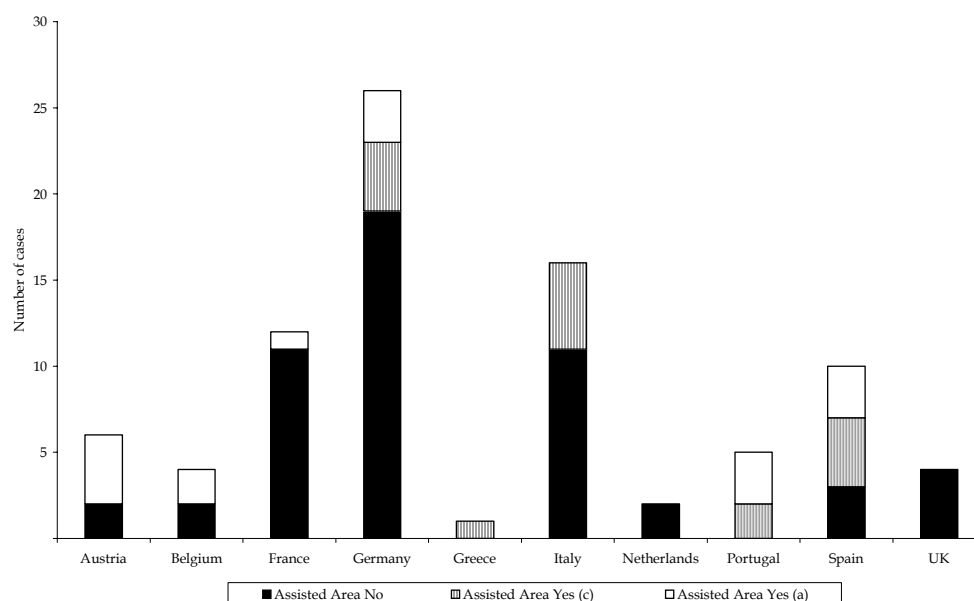
The rescue and restructuring State aid guidelines allow the Commission to adopt a somewhat flexible approach for rescue and restructuring State aid to companies in regions that are fundamentally disadvantaged (Article 87(3)(a)) and regions that are temporarily disadvantaged (Article 87(3)(c)) and in Figure 2 we present, on a country-by-country basis, the split between rescue and restructuring State aid cases in assisted and non-assisted areas. The State aid cases relating to assisted areas are further sub-divided into cases relating to Article 87(3)(a) areas and Article 87(3)(c) areas¹². The label “Yes(a)” refers to rescue and restructuring State aid cases situated in the most disadvantaged regions (Article 87(3)(a) areas) and the label “Yes(c)” to State aid cases in temporarily disadvantaged ones (Article 87(3)(c) areas). The label “No” covers all the other rescue and restructuring State aid cases.

One observes that, across the EU-15 the majority of rescue and restructuring State aid was given to companies outside assisted areas, though in some countries the opposite was true. For example, rescue and restructuring State aid in Spain, Portugal and Austria was given predominantly to companies in assisted areas. This reflects the fact that assisted areas account for a large proportion of the landmass in these countries.

¹² A full breakdown by type of aid (rescue or restructuring) for each country is available in Annex 1.

Of the 86 rescue and restructuring State aid cases that we consider, rescue State aid cases accounted for about 43% of total rescue and restructuring State aid cases outside the assisted areas, 38% of total cases in the most disadvantaged areas and 31% in the temporarily disadvantaged areas.

Figure 2: Geographical Distribution of Rescue and Restructuring State Aid Cases in Assisted Regions by Type of State Aid, 1995-2003



Source: *London Economics*

Sectoral distribution of the rescue and restructuring State aid cases

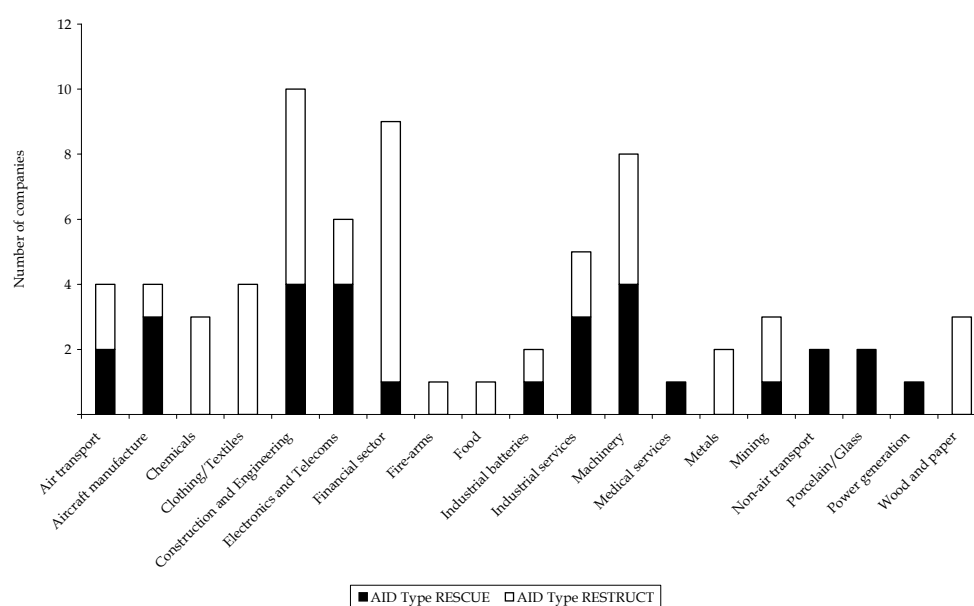
Figure 3 shows the number of aid cases awarded to individual companies, and distinguishes between the different types of aid awarded¹³¹⁴. The sector that benefited from the most awards of rescue and restructuring State aid is construction and engineering, with 10 companies having received such aid (14% of the total). The financial services industry is the sector with the second largest number of aid awards, followed by the machinery and equipment sector and the electronics and telecoms sector.

¹³ In our analysis of the distribution of aid by sector we include each aid-receiving company just once, regardless of the number of aid awards it has received.

¹⁴ It is important to note that the six companies that received two awards of State aid in the period concerned are included and classified according to the most relevant award. Thus the breakdown by aid type within sectors is not quite the full picture. Of these six companies, three received rescue aid followed by restructuring aid; one received rescue aid twice; one received restructuring aid twice; and one received restructuring aid followed by rescue aid. All four of the companies that received two different types of aid have been classified as having received restructuring aid. The relative importance of the various sectors, shown by the height of the bars, is not affected by this classification rule.

Given that the number of aid-receiving firms in each sector is low, it is hazardous to draw firm conclusions about the distribution of the type of aid within each sector. However, financial services companies tended to receive mainly restructuring aid and that the converse was true for electronics and telecommunication firms. The construction and engineering sector benefited about equally from rescue and restructuring State aid.

Figure 3: Rescue and Restructuring State Aid Cases by Sector and Type



Source: London Economics

Distribution of rescue and restructuring State aid cases by size of aid-receiving businesses

The distribution of rescue and restructuring State aid cases by size of company is shown in Table 3. Among the 71 companies that received rescue and/or restructuring aid, large companies with 1,000 or more employees accounted for slightly more than 50% of all the companies having received such aid and those with less than 500 employees accounted for only about 30% of the aid-receiving companies.

The relatively limited presence of SMEs among the aid-receiving companies is due to the fact that there exist several SME-focused rescue or restructuring aid schemes that have been approved by the European Commission. Under these schemes, individual aid awards do not have to be individually notified to the European Commission provided the level of the aid remains under a certain threshold.

Table 3: Distribution of Companies Receiving Rescue or Restructuring State Aid by Size of Company

Number of employees in company	Number of companies	Percentage of all companies
Less than 250	7	9.9%
250-500	13	18.3%
500-1000	11	15.5%
1000-2500	13	18.3%
2500-5000	8	11.3%
5000-10000	7	9.9%
More than 10000	12	16.9%
Total	71	100.0%

Source: London Economics

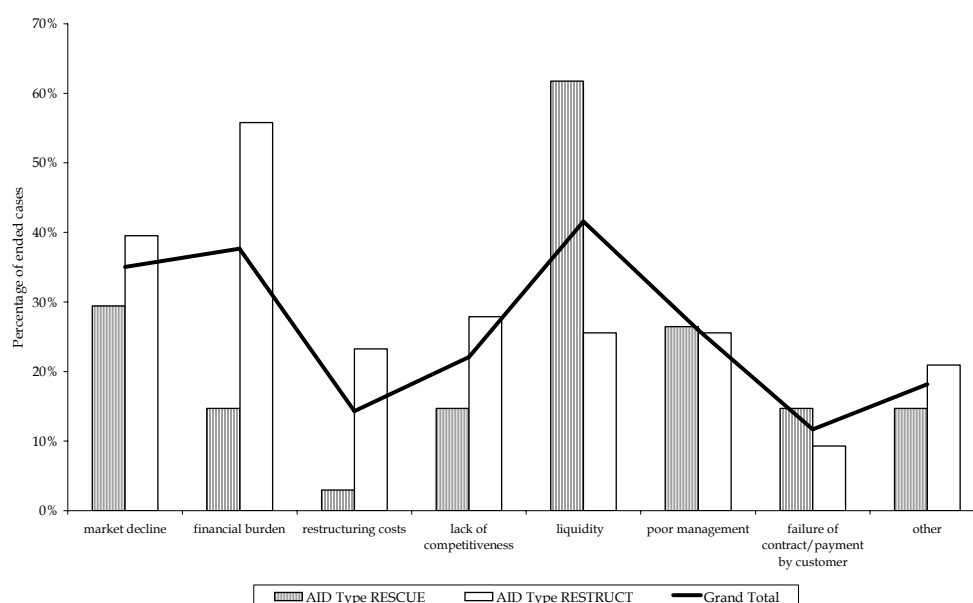
Types of business problems encountered by rescue and restructuring State aid receiving businesses

Since many different reasons as to why the beneficiary of the aid ran into business difficulties are cited in each of the State aid cases, these have been regrouped into a few broad categories or factors such as market decline, financial burden, restructuring costs, lack of competitiveness, liquidity, poor management, and failure of contract payment by customer. Often, difficulties were attributed to more than one cause. In Figure 4, we show the frequency with which a particular factor was reported as a cause of difficulties¹⁵.

Unsurprisingly, rescue aid-receiving companies generally seemed to be suffering from liquidity problems. In contrast, companies receiving restructuring aid seemed to be primarily burdened by heavy financial burdens (e.g., accumulated debt). The third and fourth most common factors in both rescue and restructuring aid cases were market decline and poor management.

¹⁵ A few points should be noted in assessing the reasons for business difficulties. Firstly, these were the reasons given in the decision documents of the Commission, and are ultimately based on the presentations of the Member States. Secondly, restructuring costs can be considered to have been a cause of business difficulties if the company found, subsequent to an attempt to restructure through self-financing, that it had burdened itself with damagingly high costs. This is distinct from foreseeing the problems posed to a company by restructuring costs, since covering the costs, in this sense, would be perceived as a purpose of the aid.

Figure 4: Reasons for Business Difficulties



Source: London Economics

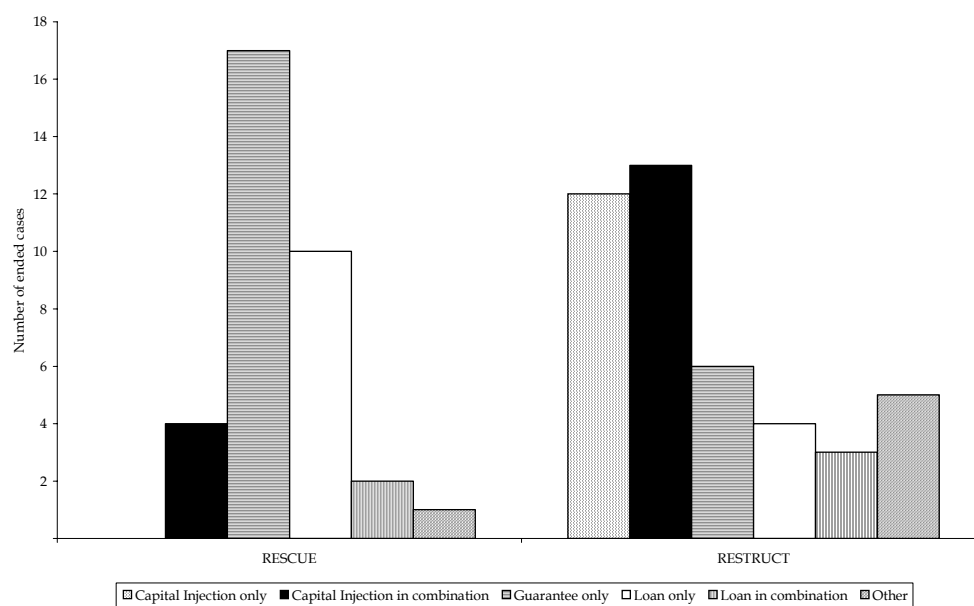
The financial instruments used in the rescue and restructuring State aid cases

State aid was conferred to companies through a wide variety of financial instruments¹⁶ such as capital injection, debt waiver or restructuring debt, loan, guarantee, or some combination (see Figure 5). Two facts are worth noting. First, the variety of instruments used to confer rescue aid was narrower than the range of instruments used for restructuring aid. Second, though financial instruments were sometimes used in combination, there was a clear preponderance towards using a single financial instrument in both the rescue and the restructuring State aid cases.

Loans and guarantees, each conferred in isolation, accounted for almost all of the instruments used in the rescue State aid cases. In contrast, restructuring aid was provided through a wider range of instruments but capital injections were the most common.

About 1 in 14 cases involved debt waivers, and the same is true of debt restructuring. Overwhelmingly, these debt adjustments occurred in restructuring State aid cases. In our analysis we considered that subordinated loans are distinct from capital injections, and are included in the category "Other" in Figure 5. The other two aid instruments included in "Other" comprise one case of a repayable shareholder advance (for rescue aid) and one case of a debt waiver being used on its own (for restructuring aid).

¹⁶ The case reports did not discuss the reasons for choosing one type of aid instrument over another.

Figure 5: Instruments Used in State Aid Awards

Source: London Economics

Source: London Economics

4 Survival of Aid-receiving Companies

The current legal status of the 71 companies having received rescue and restructuring State aid is shown in Figure 6 by the type of aid they received. This information has been put together using a variety of sources.¹⁷

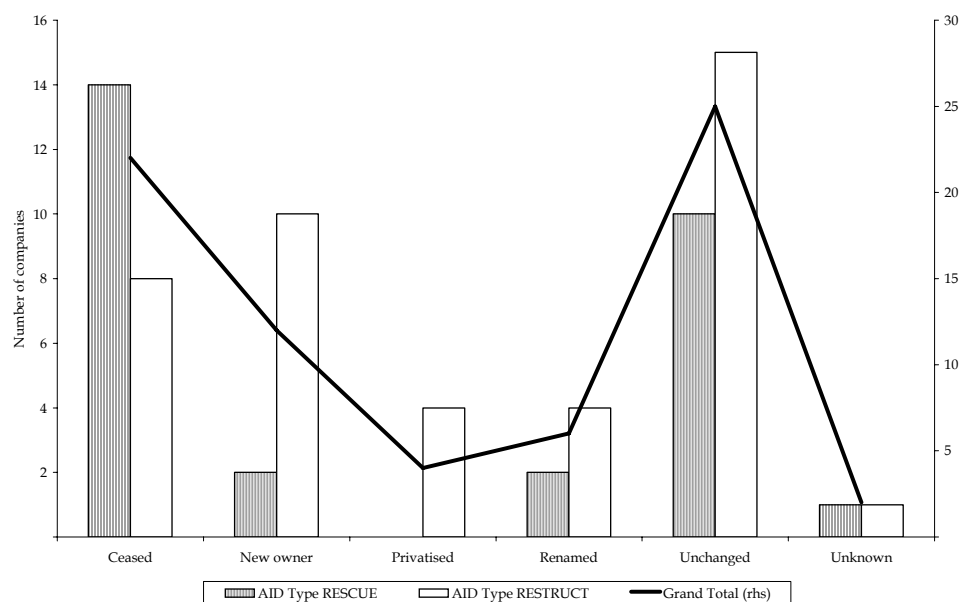
The key facts to note are that, in 2003, more than a third of the companies have maintained the same legal status that they had at the time of the aid being awarded; almost a third of companies (22) had ceased operations¹⁸; twelve companies had been taken over, of which 11 maintained the original brand name, and 8 of those 11 can be considered as still distinct operating entities¹⁹; and six have been renamed, often re-branding themselves following their episode of difficulty.

¹⁷ Such as the websites of the aid-receiving companies, LexisNexis and the archives of the Financial Times (at FT.com) and general searches over the Internet.

¹⁸ Not all of the companies that ceased operations have disappeared without trace. In 3 cases, a new company has used the location and some semblance to the ceased company's name, but has not continued the ceased company's economic activity (product range or service line). Therefore, though superficially it might appear that the company has remained in place, it has actually ceased operations. A further 3 companies sold off their major operations: one became officially bankrupt in February 2004 (though it effectively ceased in 2003), and the operations of the other two were dramatically reorganised, and thus they have been classified as having ceased operations.

¹⁹ These 8 companies, which have been taken over, but are still distinct entities, vary in their degree of independence, ranging from a distinct company within an umbrella group to a totally separate company that is owned by an investment group. Most are in the former category, and some of these give some details of their economic and financial position on their websites. Only two of these 8 companies produce separate detailed financial results. In general, it appears that the aid-receiving companies that were acquired have improved their profits since the time of receiving State aid (when they were largely loss makers), though not all of them made a profit in 2002. It does not seem that any of these companies were still making heavy losses by 2003.

Figure 6: Current Status of Companies Having Received State Aid between 1995 and 2003



Source: London Economics

Next, we examine more closely from an economic point of view the mortality of the companies having received rescue and restructuring State aid by assigning a status survival or failure to each of the 71 companies according to the criteria listed in Table 4.

Table 4: Definition of Success or Failure of Aid-receiving Companies

Aid given	Events after aid was given	Survival	Explanation
	Restructuring and continuation of business activities in large part	YES	The aid has helped the company to survive during the difficult time and then used to restructure and to come back to "normal" business life.
	Restructuring and selling of large part of business	YES	The aid has helped the company to restructure and to become marketable. The fact that a large part of the assets are continuing to operate, even under a different name, shows that the aid has been successful and has helped the company to return to the "normal" continuation of its activities. Without the aid it would have been more difficult to sell the company. The aid procedure may also have been used to separate the "good assets" of the company from the less profitable ones.
	Insolvency	Excluded from analysis	The company is in a transition state, from which it could either end up in bankruptcy or recover. It is not yet possible to determine the company's survival and therefore it is excluded from our survival analysis.
	Bankruptcy	NO	

Source: London Economics

On the basis of our definition of survival, we estimate that almost 50% of the companies having received rescue State aid did not survive while only 20% of the companies having received restructuring aid folded. These findings are summarised in Table 5 which the survival performance aid-receiving companies by the Member State. French aid-receiving companies all survived, whereas about two-thirds of German companies, and only a slight majority of Spanish and Italian aid-receiving firms, did so. In all countries, with the exception of Germany, the mortality rate of companies receiving rescue State aid was higher than that of those companies having received restructuring State aid.

Table 5: Survival and Mortality of Companies Having Received Rescue and Restructuring State Aid by Country⁽¹⁾

	AID Type						All Cases
	RESCUE			RESTRUCTURING			
Country	Survived	Folded	Unknown	Survived	Folded	Unknown	
Austria		1		3			4
Belgium	1	1		1			3
France	2			7			9
Germany	9	5		5	4		23
Greece				1			1
Italy		4	1	7	2	1	15
Netherlands		1					1
Portugal				3			3
Spain		2		5	2		9
UK	2			1			3
Grand Total	14	14	1	33	8	1	71

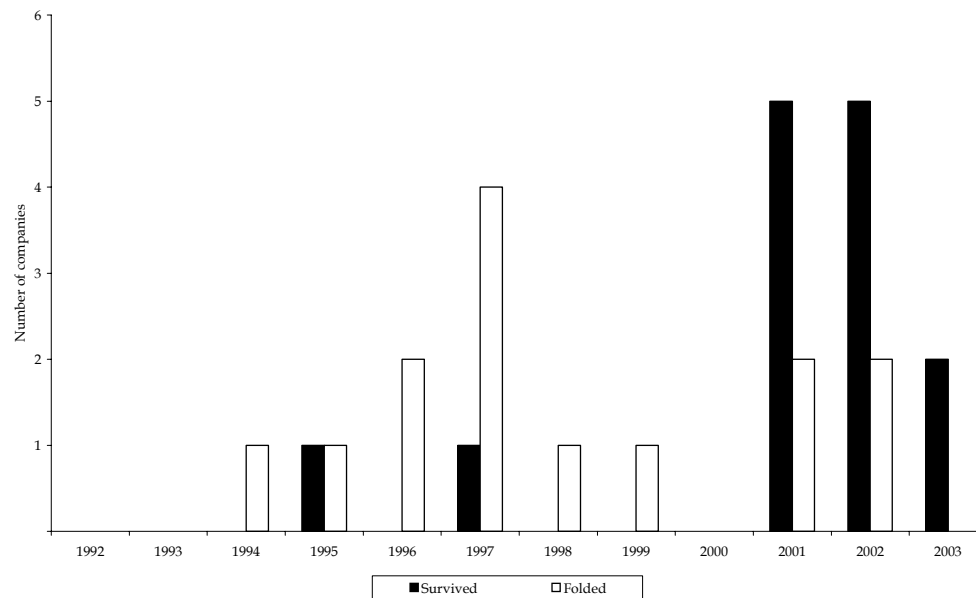
NOTE: (1) For rescue and restructuring State aid cases approved over the period 1995 to 2003 that are classified as having ended.

Source: *London Economics*

The mortality rate varies considerably according to the year when the companies received the rescue and/or restructuring State aid. In the case of rescue State aid (Figure 7), it is interesting to note that mortality varies sharply across the various cohorts. The highest mortality is observed for the cohort having received rescue State aid in 1997. Somewhat disconcerting is also the fact the recent 2001 and 2002 cohorts already show relatively high mortality figures by 2003 although relatively little time had passed since the aid was given.

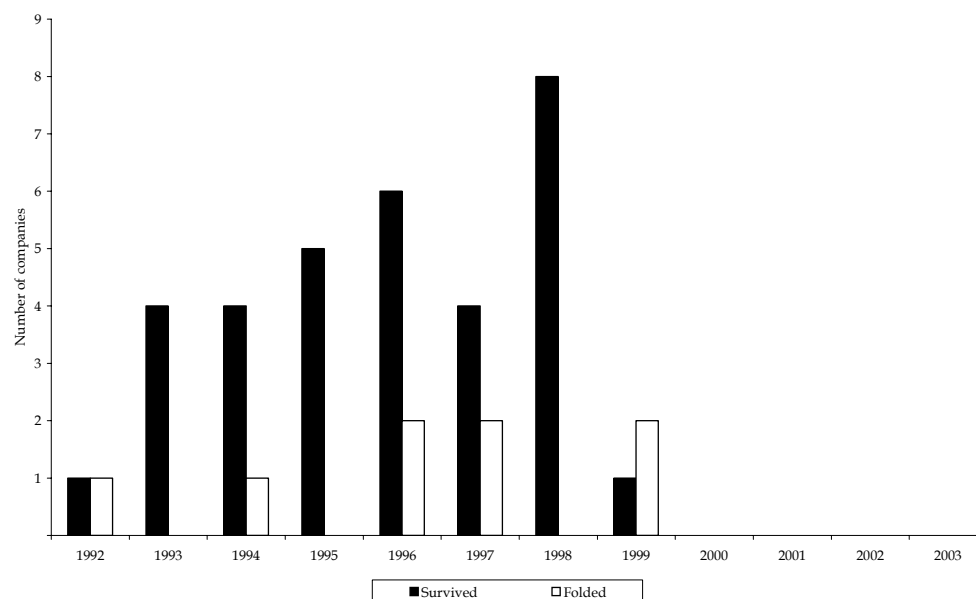
In contrast, the mortality rate of the companies having received restructuring State aid (Figure 8) is much lower and varies relatively little across cohorts. Generally, each cohort will have lost 1 or 2 companies by now.

Figure 7: Survival of Companies Having Received Rescue Aid by the Year that Aid Was First Given



Source: London Economics

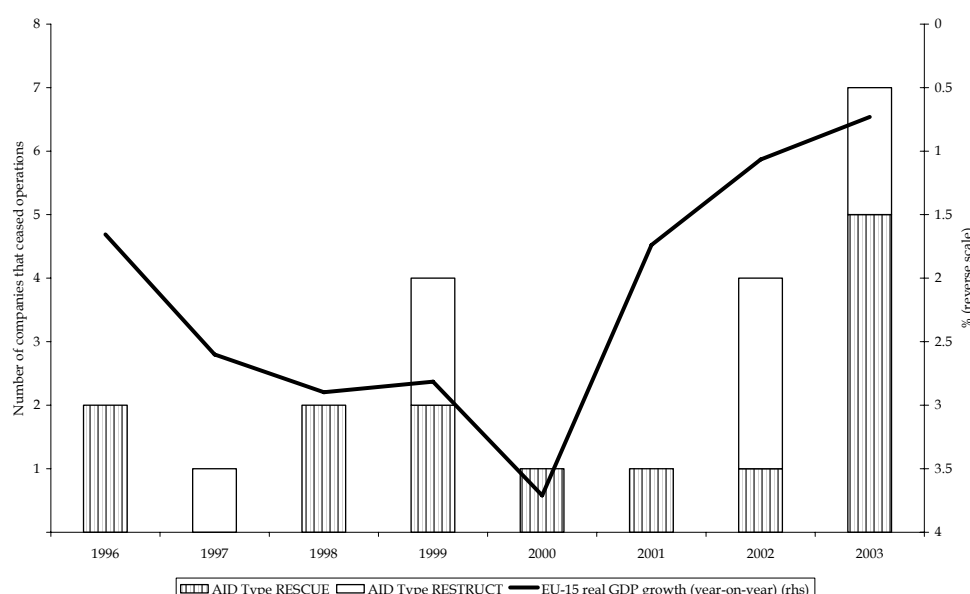
Figure 8: Survival of Companies Having Received Restructuring Aid by the Year that Aid Was First Given



Source: London Economics

Mortality peaks occurred in 1999 and 2003 (Figure 9). The business cycle for the EU-15, shown by the thick line, is plotted on a reverse scale, so that a fall in the growth rate of the economy is illustrated by an upward sloping line. Mortality does seem to be related contemporaneously to the business cycle, with most of the mortality occurring when the economy is very weak, as in 2003.

Figure 9: Year of "Death" for Aid-receiving Companies that Have Ceased Operations

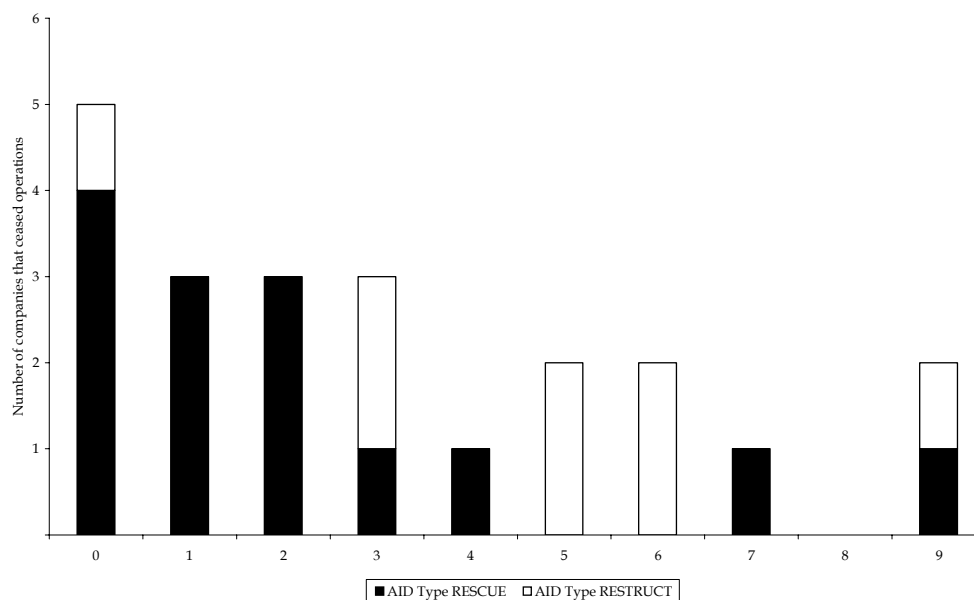


Sources: London Economics, LE calculations based on data from OECD Economic Outlook

In fact, most of the companies that folded did so within 3 years of the start of the aid. This pattern is particularly strong for companies that received rescue State aid, whilst most of the companies that received restructuring State aid and folded did so between 3 and 6 years after aid was awarded (Figure 10).²⁰

²⁰ The duration of survival is defined as the length of time (in years) elapsed between the year during which a company ceased operations and the year it first received State aid.

Figure 10: Number of Years of Survival of Aid-receiving Companies that Have Ceased Operations



Source: London Economics

5 Analysis of Determinants of Survival

We now turn to our empirical analysis of the determinants of survival among all the companies having received rescue and restructuring State aid. We begin our analysis by describing the model used in our empirical work. Next we describe the data that we used and finally we report the results of our empirical analysis.

Model specification

Our selection of the variables affecting firm survival is influenced by other studies²¹, subject to limitations of data availability on the particular variables in our data set. Previous work has typically included initial and current company size, its age, sector characteristics and demand growth, and whether the firm is part of a larger group. In our model, we include the size, age and status of the company, and sector fixed effects. We also include a number of variables to represent various characteristics of State aid, including its amount, the condition of the company at the time the aid was given as well as a control for recent awards of aid. All these factors are likely to have played a role in determining the survival of the aid-receiving company.

Denoting aid-receiving companies by $i=1,\dots,N$, our framework is based on the following equation:

$$\text{Equation 1: } PS_i = \Phi \left(\begin{array}{l} \beta_0 + \beta_1 SIZE_i + \beta_2 AGE_i + \beta_3 PUBLIC_i \\ + \beta_4 COND_i + \beta_5 AID_i + \beta_6 OTHER AID_i \\ + \beta_7 RECENT_i + \beta_8 SECTOR_i + \beta_9 DIFFS_i \end{array} \right)$$

where:

PS_i is the probability of survival of company i .

Standard Control Variables:

$SIZE_i$ denotes the size of the company at the beginning of the aid.

AGE_i is the age of the company.

$PUBLIC_i$ is an indicator variable denoting the status of the company (state-owned or not).

²¹ Firm survival has been assessed in many studies. Audretsch (1995) argues that firms enter at a small initial size relative to minimum efficient scale and so will exit unless they can grow. Hence survival rates should depend on initial size and growth. Jovanovic (1982) and Ericson and Pakes (1992) argue that a firm's success depends on its learning about its ability; survivors are those who have good ability and so become large. Hence survival should depend on current size. Disney et al. (1999) estimate how the hazard rate of exit depends on establishment size, business cycle and cohort variables in UK manufacturing. Their results indicate a secular fall in cohort survival probabilities over time, and complex interactions between survival, age of firm, and the size of the firm over time. Other studies that analyse exit rates are Mata et al (1995), on a similar data set for Portugal, and Audretsch and Mahmood (1995), using a cohort of US firms started in 1976. Boeri and Bellmann (1995) estimate the log odds ratio of the hazard rate on German data and Doms et al (1995) estimate a binary probit for whether a plant failed or not between 1988 and 1991.

As these three variables, or variants of them, are included in the vast majority of studies analysing company survival, they can be considered as standard controls for this type of analysis.

$COND_i$ is a variable indicating the condition of the company at the time of the aid. It is likely that some companies may have survived relatively to others simply because they were in a better condition when they received aid. The idea is that it might have been easier (or quicker) for these companies to restructure their operations and to restore normal business. Thus, we would expect this variable to be positively signed.

AID_i is the amount of liquidity (grants, capital injections and loans) given as aid to the company. We would expect liquidity to have a positive impact on the probability of survival. This implies that the probability increases with the amount of aid given.

$OTHER\ AID_i$ is an indicator variable acting as a proxy for other aid instruments in addition to grants, capital injections and loans. In many cases the aid package included also guarantees, debt waivers/write-offs, debt restructuring and other aid instruments in addition to new financial resources. These other aid instruments may have provided some additional relief to aid-receiving companies and thus increased their probability of survival.

$RECENT_i$ is a variable indicating whether the aid was given recently. We would expect State aid to protect recipients from failure in the short run. If we omitted this control, we would expect our results to understate the probability of failure and therefore be biased in favour of survival. The sign of this variable is therefore expected to be positive.

$SECTOR_i$ denotes demand growth in the sector where the aid-receiving company operates after the aid was given. We would expect that fast demand growth in the sector after the aid was given would improve a company's chance of survival, and thus would expect a positive coefficient on this variable.

$DIFFS_i$ is a set of variables indicating the various reasons for difficulties leading up to the granting of State aid. Aid-receiving companies may have been in difficulty for various reasons such as market decline, huge financial liabilities, poor management etc. and the idea here is to test whether the type of difficulty mattered for survival. It is important to stress that this set of variables focuses on the situation faced by aid-receiving firms before the aid was given.

Φ is the cumulative normal distribution and $\beta_0 - \beta_9$ denote our parameters of interest.

Equation 1 will be estimated by using the Probit model. In the next sub-section we will describe our data sources as well as discuss some measurement issues with respect to our variables of interest.

Data definitions and measurement

Outcome variable (success/failure): as described in Table 4.

Company size ($SIZE_i$): is measured by the logarithm of employment at the time of State aid.

Company Age (AGE_i): is the age of the company at the time of first receiving aid.

Company status (PUBLIC_i): is a dummy variable taking value 1 if the company is state owned and 0 otherwise.

Condition of the company at the time of the aid (COND_i): is simply measured as profit/loss at the time the aid was approved, normalised on employment.

Amount of aid (AID_i): is measured as the sum of eventual grants, capital injections and loans included in the aid packages normalised on employment at the time of aid.

Other aid instruments (OTHER AID_i): is a dummy variable taking value 1 if the aid package included guarantees, debt waivers/write-offs, debt restructuring and other aid instruments in addition to grants, capital injections and loans, and 0 otherwise.

Sector growth (SECTOR_i): is measured as (average) real value added growth in the sector of the aid-receiving company from the year the aid was given to present.

Reasons for difficulties (DIFFS_i): is measured as a full set of dummies, one for each reason of difficulty (at the time of the State aid case) listed in the State aid decisions. The reasons of difficulty being analysed included market decline, financial liabilities, restructuring costs, low competitiveness, liquidity problems, poor management, external failure²² and other reasons.

Results

As already noted, our model aims to identify the factors that have contributed to the survival of firms that have received rescue and restructuring State aid. The variable of interest is the survival of the firms in 2003 and, to that end, the model is estimated on a cross section of all firms which received rescue and restructuring State aid over the period 1995-2002.

We report the results of two variants of the basic model. The first model, Model 1, does not control for any impact of initial difficulties on company survival whereas the second model, Model 2, does. The latter specification allows us to test whether the initial difficulties matter for the survival of the company and which type of difficulty is more likely to affect survival. The estimation results are reported in Table 6.

²² We use the term external failure to describe the situation where the aid-receiving company is in difficulty because key business partners are themselves in difficulty. A typical example is when an important client of the company defaults on its contractual obligations.

Table 6: Probit Estimates of Survival in 2003 of Firms Having Received Rescue and Restructuring State Aid over 1995-2002

Independent variable	Model 1		Model 2	
	Coefficient	Z-statistic	Coefficient	Z-statistic
Size	-0.023	-0.18	0.000	0.00
Age	0.006	1.37	0.010	1.41
State-owned	-0.674	-1.24	-1.021	-1.13
Rescue aid	-2.235*	-3.54	-4.569*	-3.49
Condition of the company	1.227	0.68	1.387	0.45
Aid received	1.807	1.13	3.682	1.31
Other aid instruments	0.483	1.05	0.709	1.01
Recent aid case	2.251*	2.89	3.928*	2.63
Sector growth	6.416	0.92	14.892**	1.73
Market decline	-	-	1.731*	2.14
Financial liabilities	-	-	-1.152	-1.32
Restructuring costs	-	-	0.643	0.67
Low competitiveness	-	-	-1.612	-1.45
Liquidity problems	-	-	0.186	0.23
Poor management	-	-	2.045**	1.92
External failure	-	-	0.067	0.06
Other reasons	-	-	1.183	1.42
Constant	0.431	0.47	-0.196	-0.12
Number of observations	63		63	
Pseudo R-squared	0.27		0.52	
Likelihood ratio (P-value)	0.01		0.00	

NOTE: the columns labelled 'coefficient' contain the estimated value of each parameter of the two models; the columns labelled 'Z-statistic' contain the normally distributed statistic of each parameter of the two models; Pseudo R-squared is an indicator of the goodness of fit of our models; Likelihood ratio is a statistic testing that all the parameters of our models are equal to zero; * denotes statistically significant at 5% confidence level; ** denotes statistically significant at 10% level.

Source: London Economics' estimates

The regression shows a pattern of signs that is consistent with the theoretical insights described earlier²³. Beginning with Model 1, our results show that if rescue aid is given (as opposed to restructuring aid) the company has, on average, a lower chance

²³ We have also estimated more general models of survival, where the constant element of the probability of survival is sector-specific. These estimates are obtained by introducing a full set of sector dummies, one for each sector. Our results were found robust to this specification and to a number of other experiments.

of survival. This is not to say that rescue aid *causes* low survival, but simply reflects the fact that companies which receive rescue aid have, on average, a lower probability of surviving. This result can be explained by recalling the key characteristics of rescue aid: it is given to temporarily support a firm in difficulty and does not enable the firm to undergo fundamental changes, but only to commit to a restructuring plan in the near future. In the absence of a subsequent award of restructuring State aid, the company is thus required to fund its own restructuring costs, which might deepen its problems.

Our analysis also shows that having recently received aid (up to three years prior to the date at which the company's survival status was determined) improves the chances that the company has survived. We also find that the probability of survival increases with the age of the company, better conditions of the company at the time of the aid, the amount of aid received, the presence of additional aid instruments in addition to grants, capital injections or loans, and when demand in the sector grows faster, and decreases with the size of the company at the moment of the aid and state-ownership, though these effects are less precisely determined.

We have also tested to what extent the reasons for difficulties at the time of the aid and the individual reasons for difficulties mattered for the survival of aid-receiving companies (Model 2). Our analysis suggests that if a company were in difficulty because of market decline and/or poor management, its chance of survival after receiving State aid would be higher. These results are interesting and quantitatively relevant. For example, our estimates reveal that if the reasons for difficulties were market decline or poor management, the company has roughly a 30% higher chance of surviving²⁴. All other reasons for being in difficulty are statistically insignificant at conventional critical levels. Moreover, in this specification, demand growth in the sector (after the aid was given) has a positive and statistically significant effect on company survival.

Finally, we conducted a tentative econometric assessment of whether the main features of the restructuring plans documented in State aid cases mattered for company survival. We tested for any impact on survival of the following ten features of the restructuring plans including: duration of restructuring, capacity reductions, personnel reductions, focusing on core business activities, cost-cutting, financial consolidation, selling or closure of plants and assets, new investment, training and upgrading and plant relocation. None of these variables were statistically significant at conventional levels²⁵.

²⁴ In the context of the Probit model, these effects are called "marginal effects" and indicate the change in probability for an infinitesimal change in each independent variable. Formally, the marginal effect of variable 1 is $\partial\Phi / \partial x_1 = \phi(\bar{x}b)b_1$.

²⁵ Given that 24 State-aid cases did not contain details of the restructuring plan, we had to adopt a different estimation strategy for this part of the analysis. In essence, we constructed a new model (Model 3) by adding one restructuring plan variable to streamlined version of Model 2 (see Table 6) and then estimated it eleven times, each time with a different restructuring plan variable. In this way we obtain parameter estimates of the entire set of restructuring plan variables. Full estimation results are available upon request.

6 Conclusion

This paper explores company survival after receiving rescue or restructuring State aid. Our analysis is based on virtually the entirety of rescue and restructuring State aid approvals made by the Commission between 1995 and 2003, which had repaid rescue aid or for which the restructuring period had come to an end.

In line with the characteristics of rescue aid, we find that a high proportion of firms that received rescue State aid (about 50%) did not survive. Failure among companies that received restructuring aid is much less frequent (about 20%). These failure rates are contemporaneously associated with the business cycle, with most of the mortality occurring in 2003, when the economy was very weak.

Our second finding is that if firms were in difficulty due to market decline and/or poor management, they had a better chance of surviving. High demand growth in the sector was also found to improve the probability of survival.

The evidence that we provide on company survival strongly suggests that determinants of survival are to be found, on average, outside the policy framework of rescue and restructuring State aid.

Annex 1 Rescue and Restructuring State Aid Cases and Assisted Areas

Table A1: Companies receiving State aid located in assisted areas

Country	Number of cases outside assisted area		Number of cases within an assisted area in the meaning of...				Grand Total
			87(3)(c)		87(3)(a)		
	RESCUE	RESTR.	RESCUE	RESTR.	RESCUE	RESTR.	
Austria	1	1	2	2			6
Belgium	2			2			4
France	3	8		1			12
Germany	11	8	2	1	1	3	26
Greece						1	1
Italy	3	8			3	2	16
Netherlands	1	1					2
Portugal			1	2		2	5
Spain		3		3	2	2	10
UK	2	2					4
Grand Total	23	31	5	11	6	10	86

Source: London Economics

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