UNIVERSIDAD CARLOS III DE MADRID working papers

Working Paper 08-28
Business Economic Series 05
June 2008

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# Who downsizes for longer ? A longitudinal analysis*

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**Abstract**

This contribution investigates why firms keep on downsizing once they have started to do so. From a theoretical standpoint, we develop economic and institutional explanations for explaining corporate downsizing duration. The empirical work is carried out applying event history techniques to a sample of manufacturing firms drawn from the Spanish Survey on Business Strategies from 1994 to 2005. Although results show support for persistence in downsizing over time, repeated personnel reductions is not a widespread tool in managing the workforce in this country. In addition, we find certain key corporate parameters such as profitability, temporality rate, size and employment termination costs (as well as market demand trends) to be important determinants of the continuation of on-going downsizing experiences. This is the first study on this issue using corporate-level data for Spain and multivariate methods.

***Keywords**:* Downsizing duration, Spain, organizational learning, manufacturing firms, temporary contracts, employment termination costs.
***JEL Classification**:* M54, J65, J21.

* Financial support from both the Regional Government at *Castilla y León* (project *SA020A05*), and from Universidad Carlos III de Madrid (project CCG07-UC3M/HUM-3287) is gratefully acknowledged. The data used in this work were made available from *Fundación Empresa Pública*. This work benefited from comments received from participants at EURAM 2008 Conference (Slovenia). The usual disclaimer applies.
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## INTRODUCTION

The search for competitive advantage has led organizations to become more efficient and flexible in their use of human resources. Over the past two decades, a common organizational response has been to reduce workforce numbers through downsizing (Iverson and Pullman, 2003). Its prevalence in management literature since the 1980s is due to the fact that many organizations use downsizing as a tool to cut costs, and/or to improve profitability and productivity. Particularly in the United States, since the 1980s repeated waves of highly publicized large scale layoffs have occurred: in the mid-nineties, fully 100 percent of *Fortune 500* companies reported plans to downsize in the next five years (Diamond et al., 1996). Surprisingly, in spite of the fact that the evidence so far available suggests that the much sought-after cost reductions and increased efficiencies have not materialized (Cameron, 1998; Ebadan and Winstanley, 1997; Mentzer, 1996), corporate and public sector managers in this country have shown a strong propensity to embrace downsizing: companies which have been employing this cost-cutting method are still cutting back years later (DeMeuse, Vanderheiden and Bergmann, 1994; Diamond et al., 1996). That is, research has found multiple downsizing efforts by the same firm to be rather widespread. For instance, DeMeuse, Vanderheiden and Bergmann (1994) found that 62 percent of the companies in their sample that downsized in 1989 likewise downsized in 1990; furthermore, 85 percent of the companies that downsized in 1989 downsized again in 1991.

Downsizing has also been extensively used by companies in economies characterized by stable employment practices in the last few years —such as some European countries (Filatotche, Buck and Zuckov, 2000) and Japan (Lee, 1997). In contrast with these economies, there remains no doubt that employers in the United States have pushed for and taken advantage of the greater facility to lay off workers (in terms of both a lack of legal and regulatory constraints and social norms) when business reasons make it expensive to retain them. As opposed to the U.S., in most European economies it seems harder to initiate and continue with such downsizing practices. In particular, Spain is often regarded as a country characterized by a high protection of employees' rights — due to tough job security rules, a generous unemployment insurance system and high firing costs (Jimeno, 1998). Given these institutional features and the fact that continued experiences of downsizing can have an unsustainable impact on both companies and the community —repeated downsizing may lead to a workforce that no longer has any great faith in its employers, which in turn is expressed in a less-than-desirable performance

(Mariappanadar, 2003)— it is interesting to investigate what keeps companies downsizing over time once they start doing so.

This is precisely the objective of the present contribution: to amplify our knowledge on the determinants of downsizing duration for the Spanish case. Our focus is on understanding why firms keep on downsizing once they have started to do so. We, therefore, depart from previous literature —which has focused on the determinants of a firm's decision to downsize or the extent of downsizing (e.g., Vicente-Lorente and Suárez-González, 2007; Requejo, 1996)— by centering, instead, on the temporal nature of downsizing. This requires both a longitudinal dataset —instead of cross-sectional data which, despite being easy to collect and widely available, do not suffice to measure duration in downsizing— and an appropriate statistical method: event history analysis. This technique allows us to ask two kinds of questions regarding downsizing. The first question is useful to characterize the pattern of downsizing duration over time: does the length of time a firm has downsized influence its likelihood of continuing downsizing for longer? The second question asks us to examine the association between predictors of downsizing and its duration: which firm and market characteristics are associated with on-going downsizing efforts? For this purpose, we use survey data for Spanish manufacturing firms, for the period 1994-2005, drawn from the Survey on Business Strategies —*Encuesta sobre Estrategias Empresariales*; ESEE, hereafter. The dataset used comprises relevant corporate characteristics which might be driving the continuation of firms in personnel reduction strategies.

The rest of the paper is organized as follows. Section 2 focuses on generation of hypotheses. In section 3, we present the data and variables. The econometric model is presented in section 4, and estimation results in section 5. Finally, section 6 concludes.

## HYPOTHESES: EXPLAINING DOWNSIZING DURATION

For the purposes of this study, we follow the lead of Greenhalgh, Lawrence and Sutton (1988) who used the term "workforce reductions" to address "downsizing". Since downsizing (when broadly defined) may incorporate the use of one or more resource reduction options (in conjunctions with personnel reductions), the term workforce reduction better distinguishes it from these other restructuring methods (DeWitt 1993, 1998; Hoskisson and Hitts 1994). More specifically, our definition of downsizing refers to reductions in the size of workforce under open-ended contracts (or permanent employment). The concept excludes reductions in the size of the temporary workforce, which do not normally imply the notion of actual downsizing. Therefore, we considered that a firm downsized during a given year if the number of employees under open-ended

contracts decreased from the previous year to the current year. Since our dataset collects the size of permanent work force at the end of each year (see Section 3), it is straightforward to operationalize the latter's percent variability from year *t-1* to year *t*[1]. In this section, we analyze the factors that may help explain the longevity of firms in organizational downsizing. We claim that, once the firm has decided to reduce personnel, its duration in downsizing is shaped by its experience in downsizing, institutional forces and by firm characteristics.

**Organizational experience in downsizing**

***Socio-cognitive and institutional forces***. Following, McKinley, Sáncehz and Schick (1995) —who proposed that institutional theory can help explain why downsizing spread "like wildfire through the ranks of America's largest corporations" (1995: 34)— there would exist a dynamic that leads companies to undertake downsizing simply because others in their community are doing it. They observe that constraining forces were at work pressuring organizations to downsize as a mode of conforming to institutional rules — "the right walk to walk, the right talk to talk, the right look to look" (1995:34). Closely related to constraining forces are cloning forces, which "pressure organizations to mimic the actions of the most prestigious, visible members of their industry" (1995:34). As a result, through these social and cognitive processes, downsizing is taken for granted more and more and diffuses even in the absence of compelling evidence for its financial efficiency (O'Neill, Pouder and Buchholtz,1998). According to Cameron (1994a: 183): "most companies agree that their downsizing efforts are guided more by anecdotal data from colleagues who have downsized previously, by past experience garnered from having downsized multiple times, or by mere 'gut feel' for what is right than by a set of guidelines or principles that have been validated or legitimated". In this same vein, McKinley, Zhao and Rust (2000) proposed an "institutional perspective" of organizational downsizing to explain the popular adoption of downsizing among corporations in the 1990s. They contended that downsizing takes on the status of an institutionalized norm and provides legitimacy to those companies implementing it: one downsizing announcement may motivate stakeholders to initiate (correctly or incorrectly) a subsequent round of layoffs and —

[1] This definition conveys the usual idea of intentionality found in the downsizing literature, since (i) it excludes temporary employees (which is the convention) and (ii) includes layoffs, redundancies and early retirements (see Appendix A for a review on the procedures for employee reductions by employers in Spain). Thus, if despite implementing layoffs of permanent workers in a particular year the company ends up with an increase in the size of the permanent workforce (due to hiring new permanent workers), this situation is not considered as downsizing, according to our definition. Defining downsizing as the (net) reduction in the permanent work force is coincident with that used, among others, by Tang et al. (1995), Appelbaum et al. (1987), Lewis et al. (1996) or American Management Association (1998).

depending on changing economic conditions, stakeholder pressures or the lead of other firms in the same industry— managers may believe that additional rounds of layoffs may be necessary. That is, downsizing decisions would not be based on performance concerns, but on the need to achieve or maintain social legitimacy[2].

***Organizational learning***. Learning how to downsize effectively is important not only for companies experiencing difficulties, but also as a proactive strategy for healthy organizations (Bruton, Keels and Shook, 1996; Cameron, Freeman and Mishra, 1991; Greengard, 1993; Hitt et al., 1994). Embarking on downsizing without learning how to do it well leads to several kinds of problems. The loss of vital organizational memory is one of the negative and expensive effects firms have suffered in downsizing. If managers do not think and plan ahead, their companies risk losing key skills and experiences as well as valuable knowledge when employees are moved out of their working units or leave the organization entirely (Hitt et al., 1994:25)[3].

A further typical negative effect of downsizing reported in the research that is relevant for organizational learning is that "it can foster an organization so preoccupied with bean counting, so anxious about where the ax will fall next, that employees become narrow minded, self-absorbed, and risk averse" (Henkoff, 1990:26). The ability of employees to continue to work well is likely to be severely curtailed in such stressful situations (Heckscher, 1995; Hitt et al., 1994:24), and they tend to be even less able to innovate and learn (Brockner, 1988; Dougherty and Bowman, 1995).

Probably, the most significant conclusion drawn by studies of experiences in U.S. corporations is that downsizing must be regarded as something firms have to actively learn how to do well. Instead of conceiving downsizing to be "a one-time, quick-fix solution" (Cascio, 1993:103), a comprehensive framework is required, a whole process of grappling with the underlying problems and developing a range of activities to both restructure the organization and enable employees to make the transition to different jobs within or outside the organization (Applebaum, 1991; Bruton, Keels and Shook, 1996; Cameron, Freeman and Mishra, 1991).

Therefore, in managing downsizing, companies must firstly conduct a solid analysis of the situation and build a shared need to change before engaging in cutbacks of any kind

[2] Some tentative empirical evidence of institutional forces playing a role in the dispersion of downsizing is given by Budros (1999, 2000) and Love (2000).

[3] The American Management Association, which has conducted a series of large scale studies on downsizing, found that most companies fell short of the objectives they had originally established, and that nearly half of the firms were "badly" or "not well" prepared for the process (reported in Cascio, 1993:97-99; see also De Meuse et al., 1994).

(Applebaum 1991). Involving employees in analyzing the situation and developing posible responses has been reported in the literature as an effective approach (Cameron, Freeman and Mishra, 1991; Feldman, 1993): this increases their awareness of the need to change and their willingness to participate in the process.

In a second step, companies must find it worthwhile to maximize alternatives to downsizing, in order both to maintain within the organization the experience and skills that have been built up over time and to act in a socially responsible manner towards employees (Cameron 1994b). Among the relevant practices described in the literature on downsizing are a) redeploying employees to other parts of the company, b) adjusting working time models to redistribute work differently rather than to simply "reduce headcount" (Bode, 1994); c) combining the gradual entry of young people with the gradual exit of older workers to ensure that new skills are brought on board and experience-based knowledge is passed on to the next generation. Parallel to looking for alternatives to downsizing are activities to cut costs, such as d) eliminating non-essential work processes, not just people (Greengard, 1993; Henkoff, 1990; Tomasko, 1992); and e) ensuring that status symbols, perks and bonuses for senior management are in line with downsizing goals so that management's commitment to cost-cutting is credible and not seen to be purely at the expense of other employees (Hammonds, Zellner and Melcher, 1996; O'Neill and Lenn, 1995). Possibly, the most significant alternative to downsizing is f) looking for new markets for products and services to enable growth rather than focusing only on cutbacks (European Round Table, 1997).

In a third step, to the extent that layoffs must be implemented in the downsizing process, the former must be managed appropriately, since there are a number of practices to choose from. For instance, layoffs can be made across the board or selectively; in order to avoid being left "shorthanded and shortskilled" (Hitt et al. 1994:25), companies have learned that a better strategy may be a selective approach oriented to the key competencies needed in the organization. Whichever approach is taken, the communication of clear criteria contributes to a sense of fairness in layoff decisions (Greengard,1993), and companies have found it useful to train managers to communicate layoff decisions sensitively and effectively (Kets de Vries and Balasz, 1996).

The final steps in this process of organizational learning are to manage the employees remaining in the organization and implement changes in the organization itself (Heenan, 1991). The literature reports that a frequent mistake is to overlook the effects on "survivors" of the downsizing process, particularly of layoffs (Rubach, 1995). These

employees have been found to experience fear of losing their job, guilt for still having it while former colleagues may be unemployed, anger at the organization that did this to them, and exhaustion from overload (Davenport, 1995; Smallwood and Jacobsen, 1987, Caplan and Teese, 1997).

In sum, firms who fail to manage this learning process appropriately are less likely to make poor or incorrect decisions that lead to future downsizing either as a result of letting the wrong people go or failing to make significant enough cuts to have an effect. Thus, one would expect a positive relationship between the accumulation of knowledge —reflecting the organizational learning process in downsizing— and the duration of downsizing[4]. In addition, according to the institutional and socio-cognitive forces discussed above, if companies see downsizing as something they have to get through by cobbling together a set of activities as they go, they are not likely to put in place the best available measures and use them effectively. Short-termism will then affect the decision to go on downsizing and, as a result, the probability that downsizing will end falls the longer it goes on. For these reasons, experience in downsizing is taken into account with the inclusion of dummy variables (one for each year denoting duration in downsizing; see section 4 for further details on the way these variables are defined).

Thus, from the previous arguments, we predict:

***Hypothesis 1:*** *The longer the duration of downsizing, the more likely is downsizing to be continued.*

**Institutional labour market context: Country-specific labour separation costs**

In many countries, dismissals of workers under open-ended contracts are subject to relatively high adjustment costs. These adjustment costs include fixed employment costs (e.g., administration costs for hiring and layoff), investments in firm specific human capital, long-term work incentives (e.g., seniority wages), and separation costs due to institutional employment protection (e.g., severance pay, law suits) —see Abowd and Kramarz (2003). Among the latter, in Spain firms' costs of changing their permanent workforce size are determined by legislation that protects workers against individual dismissals and by specific requirements for collective redundancies (Toharia and Malo, 2000). The main difference between temporary and open-ended contracts is that the latter provide the right to sue the employer for unfair dismissals when the labor relationship is terminated by the employer: a dismissal can be very expensive for the employer in comparison to other countries (Appendix A reviews the procedures for

[4] This does not imply that companies desire to remain in a downsizing mode, since this practice may have enough negative consequences for all concerned (even top managers).

employee reductions by employers in Spain). Thus, regulation on individual and collective dismissals —as well as the retribution offered by the firm to workers in cases of early retirement— increases the costs enterprises incur when terminating contracts, either directly via payments or indirectly via procedural costs (e.g. notice periods or court trials). Such payments reduce the gain to a firm from dismissing a worker, and hence would be predicted to decrease the rate of worker dismissal. Moreover, not only by increasing the costs of employment adjustments are employment termination costs expected to slow the adjustment of employment to changes in output. Contract provisions may also require advance notice of layoffs, transfer opportunities, or outplacement assistance. Advance notice of layoffs often leads to discussions between union and management that generate proposals for avoiding layoffs, such as economic concessions for job security (Greenhalgh, Lawrence and Sutton, 1988). If this is the case, by foreseeing these discussions, management may be reluctant to go on with work force reductions (or may decide to postpone downsizing until the economic situation of the company is so compelling that severe downsizing is implemented to best accomplish shrinkage).

On the whole, given that institutional labor market factors are expected to play a key role as regards downsizing duration[5], we use a proxy for the extent to which the company is incurring in costly adjustments of employment: the ratio of severance, early retirement and voluntary severance pay over total labor costs. Thus, we predict:

***Hypothesis 2:*** *Firms incurring larger costs in adjusting employment are less likely to continue downsizing.*

**Firm characteristics**

***Firm's temporality rate:*** The importance of employment flexibility has been discussed in many economic and management studies (Abraham, 1988; Brodsky, 1994; Carlsson, 1989; Houseman, 2001; Hunter et al., 1993). Firms have several options to react to demand-induced output fluctuations (Pfeifer, 2005). One consists of varying the number of temporary employees to adjust employment to firm's profit maximizing level. Typically, the peripheral workforce consists of contingent workers with fixed-term

[5] A series of reforms attempted to remove existing rigidities in the Spanish labour market from the eighties, so that the responsiveness of employment to changes in output might have risen following these reforms. In 1984, the use of fixed-term contracts was encouraged, which carried few of the costs associated with permanent employment. In 1994, a second batch of reforms was introduced aimed at gaining flexibility into the management of labor resources —to this end, apprenticeship, part-time and temporary replacement work contracts were introduced, and collective redundancies deemed justifiable on technological, economic and certain other grounds were made easier (Corkhill and Harrison 2004).. Likewise, in 1997, permanent contracts were introduced with lower severance payments and firms were

contracts, who have low levels of firm specific human capital and weak employment protection (OECD, 2002: 127-185; OECD, 2004: 61-125). Severance payments are low or even non-existent for temporary contracts. Thus, temporary work arrangements offer potential ways to avoid adjustment costs and as such they may help accelerate the adjustment of the workforce to economic shocks (Bentolila and Saint-Paul, 1992; Foote and Folta, 2002; Hagen, 2003). This is particularly acute in Spain, where since 1992 temporary employment has accounted for about one third of total employment—it is the highest rate in the European Union (in Europe the average proportion is around 13%)—and it has reached a kind of "steady state" from then on: independently of policies and of the business cycle, it has remained more or less stable.

According to dual labor market theory, employees with temporary contracts can be interpreted as a firm's peripheral workforce, whereas non-temporary employment relationships are a typical characteristic of the core workforce (Atkinson, 1987; Cappelli and Neumark, 2004; Kalleberg, 2001). The core-periphery hypothesis implies that non-temporary employees gain a higher degree of job security due to the use of a flexible workforce, since temporary employment is used as a "buffer", which is adjusted to demand fluctuations (Booth et al., 2002). Employers are able to treat temporary and regular, full-time employees differently in many ways, such as the extent to which they are promised continued employment, what they are expected to contribute to the organization and other understandings related to the employment contract. Permanent workers exploit their lower likelihood of becoming unemployed on the grounds that a 'high' wage claim hardly affects their probability of survival since the eventually laid-off worker is a temporary one given the lower dismissal costs associated to temporary work contracts. In short, the bargaining position of the insiders may be strengthened since dismissals provoked by excessive wage settlements may affect temporary workers first (Jimeno et. al., 1993, Bentolila et. al., 1994).

From the above considerations, it follows that firms may use fixed-term contracts to adjust to demand fluctuations and decrease the turnover of permanent workers simultaneously. This way, firms would be taking advantage of the lower dismissal costs associated with the discharge of temporary workers when no longer needed. The firm temporality rate is computed by dividing the number of workers with temporary workers over the total number of employees.

Thus, the following hypothesis is put forward:

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allowed to dismiss workers on permanent contracts on the grounds of falling consumer demand and the need to regain competitiveness.

***Hypothesis 3:*** *Firms with a larger proportion of temporary workers are less likely to continue downsizing.*

***Firm size:*** Firm size is related to several organizational attributes. One such parameter is the amount of discretionary resources (i.e., slack) that firms have available (Dougherty, 1979). Organizational size reflects the discretionary resources available to (among other things) attract or provide for members of the organization. One purpose for which discretionary resources can be employed is to fund disengagement incentives, which are incentives provided to employees to entice them to voluntarily leave the organization (such as early retirement programs or voluntary severance packages; see Nixon et al., 2004). Larger firms, with more absolute resources, may not feel as much impact on corporate performance of employing disengagement incentives compared to the impact on the performance of smaller firms. Additional links between firm size and the duration of downsizing occurs for two reasons: (i) the economic argument associates large size with operating inefficiencies: larger firms are more likely to be less efficient and to have more slack personnel (Budros, 1999). Therefore, the need for continuing downsizing might be more compelling: this way, managers might enhance financial performance by preventing their firm from employing too many people and from operating with over-bureaucratic (or ill-conceived) structures. And (ii) the institutional argument is that highly visible large firms downsize for longer in order to be viewed favourably by stakeholders as users of the latest corporate practice (Edelman, 1990; Powell, 1991) —see, in this respect, the arguments from section 2.1 above. The number of employees is included to control firm size through a set of dummy variables denoting $\leq 50$, $> 50$ & $\leq 100$, $>100$ & $\leq 200$, $>200$ & $\leq 500$, and $>500$ employees.

Thus, we predict:

***Hypothesis 4:*** *The largest the size of the firm, the more likely the firm is to continue downsizing.*

***Profitability.*** Unsatisfactory performance or significant profit declines are corroborated as explanatory factors of downsizing (Kang and Shivdasani, 1997; Rust, 1999; Ahmadjian and Robinson, 2001; Budros, 2002). When the firm implements downsizing once low levels profitability have been achieved, the downsizing could be viewed as a reactive measure in order to improve conditions in the future. Lengthening downsizing under these conditions may improve the short-term prospects of the firm. When the decision to implement downsizing is followed by high company performance results, downsizing under these circumstances may be interpreted as a proactive strategy that would create higher cash flows available to shareholders —lower input costs and,

hence, higher profit margins may be achieved (for instance, technological advances or more efficient production methods will allow the firm to operate with fewer employees). However, these proactive downsizing decisions are expected to be less frequent than the reactive ones (those taken as a consequence of negative firm performance). Thus, we claim firm performance and downsizing duration to be negatively associated, after controlling for the remainder of predictors —among them, stakeholder pressures to implement proactive downsizing are already taken into consideration through the inclusion of the firm size variable (as explained above). Profitability is taken into account by two measures of financial accounting outcomes: return on assets (operating income/total assets) and return on sales (operating income/total sales). Thus, we predict:

***Hypothesis 5:*** *The largest corporate profitability is, the less likely the firm is to continue downsizing.*

## DATA AND VARIABLES

### Data

The present study utilizes a large sample of yearly spell data from the Spanish Survey of Business Strategies (ESEE) for the years 1994 to 2005. This is an annual survey of Spanish manufacturing firms sponsored by the Ministry of Industry and carried out since 1990. Certain features of the ESEE make it suitable for our analysis. Firstly, the ESEE covers a wide range of Spanish manufacturing firms operating in all industries. The sample is representative of Spanish manufacturing firms with between 10 and 200 employees; it is probabilistic, and stratified by industry and firm size (in terms of the number of employees). Secondly, the ESEE provides relevant corporate parameters that might be driving the continuation of firms in downsizing. Thirdly, and most importantly, as of 1993, several questions regarding changes in workforce size were included in the survey. Some of the firms in the sample reduced permanent workers during the first year they featured in the sample, so we do not know whether this was the year they began their spell of downsizing or whether they began some years earlier. Should we include these data in the analysis, we would incur in a problem of left-censoring that would lead to underestimation of the length of such spells. In order to avoid this problem, we only consider the downsizing spell if the exact year it began is known. Therefore, as we do not consider spells already under way in 1993, the first downsizing spells in our sample kick off in 1994. The selected firms are then followed until the year 2005 (which is the last year for which our dataset includes variables collecting changes in workforce size). Every firm which goes on reducing its permanent

workforce size after 6 years is considered a censored observation (given the scarcity of observations beyond this duration), as well as firms observed in the last downsizing year in the database (due to the fact that their ensuing downsizing status remains unobserved). After cleaning the data, we ended up with a sample of 1,188 companies (1,985 company-year observations).

**Sample statistics: The distribution of downsizing duration**

In order to find out how long firms go before stopping permanent workforce reductions, we will make use of event history data for discrete-time processes. The fundamental tool for summarizing the sample distribution of event occurrences is the life table (see Table 1). As befits its name, a life table tracks the event histories (the "lives") of our sample of companies from the beginning of time (when no company has yet experienced the target event) through the end of data collection (year 2005). In our case, we track the downsizing duration of 1,188 companies. Defining the "beginning of time" as the data where the company begins downsizing, our research interest centers on whether and, if so, when these companies stop downsizing.

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Insert Table 1 about here

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In Table 1, we have labeled the time intervals using ordinal numbers. Companies are observed at time 0. No event can occur during the $0^{th}$ interval, which begins at time 0 and ends just before year 1, the first observable event time (conceptually, this interval represents the "beginning of time"). Each subsequent interval —labeled 1 through 6— refers to a specific year. Divided into a series of rows extending time intervals, Table 1 includes information on the number of companies which: entered the interval (column 3; i.e., the number of companies where downsizing occurs at the beginning of each year[6]); experienced the target event during the interval (column 4; i.e., the number who stopped downsizing during the year); were censored at the end of the interval (column 5; i.e., were still downsizing when data collection ended). Taken together all these columns provide a narrative history of event occurrence over time. At the "beginning of time" every company was downsizing. During the first year, 475 companies quit by the end of that year and 260 were censored. This left only 453 companies (1188-475-260) to enter the second year and of these, 186 quit by the end of that year and 85 were censored. During the sixth year, of the 24 companies who downsized continuously for 6

[6] We use the term *risk set* to refer to the number of companies who enter each successive time period: those eligible to experience the event during that interval.

years, 7 quit by the end of that year and 17 were censored. This life table describes the event histories for 1,985 "company-years": 1,188 year 1's, 453 year 2's, up through 24 for year 6's.

Additionally, column 6 in Table 1 shows the proportion of companies downsizing at the beginning of each year which stopped doing so at the end of the year. That is, it shows the conditional probability that company *i* will stop downsizing in time period *j* given that it did not experience it in any earlier time period (i.e, the *hazard*; see Section 4 for a more formal explanation on the hazard rate). Among the 1,188 companies, 0.3998 (n=475) left by the end of their first year. Of the 453 which kept downsizing for more than one year, 0.4106 (n=186) stopped downsizing by the end of their second. These proportions are the discrete limit of the well-known Kaplan-Meier estimates of the hazard for continuous-time data (Efron, 1988).

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Insert Figure 1 about here

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The magnitude of the hazard in each time interval indicates the risk of event occurrence in that interval: the greater the hazard, the greater the risk. Figure 1 shows both the sample hazard and the predicted hazard (see Table 3 below). As can be observed, in the first two years of downsizing, the sample hazard is around 0.40. This indicates that over 40% of the companies still downsizing at the beginning of each of these years stops downsizing by the end of the year. After these initial "hazardous" years, the risk of stopping declines (by year 3, the hazard never exceeds 0.30) and then increases during the last two years. Therefore, the estimated hazard function peaks in the first few years and declines thereafter: it is a non-monotonic hazard function (it is U-shaped from the second year on). Thus, companies are more likely to stop downsizing at two points: immediately after their initial implementation and then after having used downsizing for a long period of time (five or six years). In the middle period —between the second and the fourth years— the effects of experience reign, with relatively few continuing companies stopping workforce reduction. Therefore, novice downsizers, or those with only a few years of experience are at greatest risk of stopping downsizing (it is as if companies sought to exit the status of downsizing as quickly as possible). However, once they gain experience, the risk of stopping downsizing substantially declines and slightly increases for long periods of time.

Finally, Table 1 shows the survivor function. This function, unlike the hazard function (which assesses the *unique* risk associated with each time period) *cumulates* these period-by-period risks of event occurrence (or more properly, *non-occurrence*) together

to assess the probability that a randomly selected company will "survive" (i.e., will not experience the event)[7]. The estimated survival probability for year *j* is simply the estimated survival probability for the previous year multiplied by one minus the estimated hazard probability for that year. For instance, we estimate that 0.354 of all companies survive through the second year. Because the estimated hazard probability for year 3 is 0.2967, we estimate that 0.7033 of those in the third-year risk set will *not* stop downsizing that year. An estimate of the survival probability at the end of the third year is thus (0.354)*(0.703)=0.249. Having characterized the distribution of our event time of interest (i.e., stopping downsizing) using the hazard and survivor functions, we can use an estimate of the distribution center: the estimated median lifetime[8]. It is the point in time by which we estimated that half of the sample has stopped downsizing, half has not. Thus, it answers the question "How long does the average company downsize?" According to Table 1, we know that the estimated median lifetime falls somewhere between year 1 and year 2. For this purpose, following Miller (1981), we linearly interpolate between the two values of the survivor function that bracket 0.5, and obtain an estimated median lifetime of 1.4 years[9].

**Dependent variable**

We record the dependent variable as a series of binary outcomes denoting whether or not the event of interest occurred at the observation point (i.e., stopping downsizing). As explained above, each discrete time unit for each firm is treated as a separate observation or unit of analysis. For each of these observations, the dependent variable is coded as 1 if the event occurred to that firm in that time unit; otherwise, it is coded zero. Thus, if a firm experienced the event at time 5, five different observations would be created. For the fifth observation, the dependent variable would be coded one. To illustrate the form of the dependent variable used, consider the downsizing data given in Table 2. The first column of data gives an identification number for each firm. The second column of data is comprised of a sequence of zeroes and ones. A zero denotes that in that year, the firm continues reducing the size of its permanent workforce —i.e., the event does not occur. A one denotes stopping downsizing —i.e., the event occurs.

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[7] At the beginning of time, when no one has experienced the event, every company is surviving, and so by definition, its value is 1

[8] If there were no censoring, all event times would be known, and we could compute a sample mean. But because of censoring, this estimate of central tendency (the median lifetime) is preferred.

[9] Formally, let *m* represent the time interval when the sample survivor function is just above 0.5 (here, year 1), let $S(t_m)$ represent the value of the sample survivor function in that interval, and let $S(t_{m+1})$ represent its value for the following interval (when it must be just below 0.5). Then the median lifetime is estimated as: Estimated median lifetime= $m + \left[\frac{S(t_m) - 0.5}{S(t_m) - S(t_{m+1})}\right]((m+1) - m)$.

Consider case 1. We see that this firm "enters" the process in 1994 and progresses through 6 years until in 1999 the firm stops downsizing: the event occurs. Firm 2 begins downsizing in year 1997 but stops at the second year (1998). Thus, although our dependent variable is a sequence of zeroes and ones, the information conveyed by this sequence is equivalent to that conveyed by the actual duration time[10].

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Insert Table 2 about here

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**Control variables**

A number of economic controls were added following previous research on downsizing (descriptive statistics for the main variables used in the analysis are shown in Appendix B).

***Employee productivity.*** Managers usually undertake cutback measures to improve efficiency when labor productivity drops in order to restore the undermined company competitive position (Budros, 1997) and/or to adjust for its oversized staff (Greenhalgh, Lawrence and Sutton, 1988). Employee productivity is measured through the value added per employee ratio, which allows us to examine the impact of organizational performance on downsizing duration, apart from financial performance. Moreover, given that downsizing is frequently encouraged by managers with the purpose of decreasing labor costs —and, therefore, increases in labor costs (wage, salaries and social security contributions) may induce continuation of downsizing— we use the log transformation of the ratio of labor costs over sales in order to control the potential impact of labor costs on workforce reductions.

***Market demand.*** Demand changes are additionally viewed from an economic perspective as a basic determinant of labor contracting (Ehrenberg and Smith, 1994) as well as an environmental factor of organization size and growth (Harrigan, 1980). Evidence for US firms supports a robust relationship between downsizing strategies and sales cutbacks (Budros, 1997; DeWitt, 1998). We measured the trend of demand through a set of dummy variables collecting whether the market addressed by the company has enlarged, remained constant or decreased, as well as through a dummy variable which collects whether the market addressed by the firm is in recession. Additionally, we also include the log transformation of the firm's average use of

[10] This way of arranging the data allows us collect the cases where a company downsizes for one or two years, then stops for a year or two and then resumed the practice.

capacity utilization —in times of weak capacity utilization, employers will be eager to continue firing workers (Greenhalgh, Lawrence and Sutton, 1988)

***The extent of permanent workforce reduction***. As the proportion of workforce reduction is larger, the firm may naturally have less need to continue downsizing in subsequent years because large downsizings may have especially severe effects: a major loss of human capital is likely to disrupt a firm's bundles of resources and thereby downgrade its set of capabilities required to create and sustain a competitive advantage (Nixon et al., 2004). We therefore compute the percent variability in the permanent workforce from year *t-1* to year *t*.

***Liquidity and leverage***. When a firm is experiencing lower operating income, and this situation persists, management may be forced to undertake more drastic measures to mitigate the problem: laying off employees may be the only answer as a reaction to financial distress (Hambrick and Schecter, 1983; Pearce and Robbins 1993, 1994; Robbins and Pearce, 1992; Schendel and Patton, 1976). By lowering labor expenses, a firm may be better able to meet its immediate financial obligations. Moreover, if the firm has to service a large amount of debt, it will be more difficult to pay creditors. As a result, continuing downsizing will be less desirable, due to the costs associated with the reduction in the levels of permanent workers. On the contrary, lower leverage implies that it is easier to pay creditors, so that it becomes less necessary to reduce the permanent work force size so as to release internal resources for paying creditors or convincing them to concede the firm a deferment in payments (Requejo, 1996). We therefore take the firm's debt-to-assets ratio as an indication of its leverage. In addition, we include the current ratio —i.e., the ratio of current assets to current liabilities— as an indication of a firm's market liquidity.

***Firm's age***. Eldest organizations might be more subject to organizational inertia and resistance to change, due to their bureaucratization as time goes by (Hannan and Freeman, 1984). Thus, according to this view, such firms will be more reluctant to go on downsizing. Moreover, as time goes by, lack of coherence between firm's environment and its organizational structure is more likely, so that a need for continuing with downsizing practices may be more compelling. In addition, the firm's life cycle is an important factor behind restructuring decisions (Coucke, Peenings and Sleuwagen, 2007). Older firms facing more competitive pressure and operating in mature markets have to focus on cost reduction: thus, they may find it more profitable to go on downsizing. Age is included through a set of four dummy variables collecting the firm's foundation year: $<1960$, $\geq 1960$ & $\leq 1975$, $>1975$ & $\leq 1985$ and $>1985$.

***Type of ownership***. In order to account for the effects of different types of ownership, we distinguish five categories: Individual owner, Public Limited Company, Limited Company, Cooperative and Other. In addition, since the selection of managerial personnel policies is influenced by whether an organization is in the public or private sector (Dobbin et al. 1998), we control whether a firm's capital is owned by a public institution in a substantial proportion by including a dummy variable which takes the value 1 if public ownership is above 50 percent of total capital (and 0 otherwise). Analogously, as the origin of the corporate block holder investing in the firm may affect the behavior of the firm and its knowledge of downsizing strategies, we include a dummy variable, which takes the value 1 if foreign ownership is above 50 percent of total capital (and 0 otherwise).

***Industry and local economic cycle effects***. Differences between trade union influences may exist among industries, which may shorten or lengthen the downsizing experiences. In addition, in highly-automated industries downsizing will be infrequently continued to improve firm performance as these industries typically have less human (as compared to equipment) contribution to the final products (Cherns, 1976; Susman and Chase, 1986; Trist, 1978) —on the contrary, in low-automation manufacturing industries, downsizing may have a greater impact on firm performance because there is more human contribution to the organization's output (and will therefore be more necessary to maintain). Moreover, firms in various industries may be more inclined to downsize because the effects of economic factors may be greater on these firms. For these reasons, we control the industry by including dummies for twenty categories[11]. Finally, workforce reduction is typically countercyclical; i.e., it peaks during economic downturns and declines during periods of economic growth (Fallick, 1996: 1), with the reason being that in difficult economic times, a firm's need to reduce expenses is larger (Nixon et al., 2004). Thus, we include as a covariate the unemployment rate in each Spanish region where firms are located.

**METHOD**

In this section, we model the probability that a firm will stop reducing personnel after some specific interval of time (conditional on continuing downsizing up to that point). Given the structure of the discrete-time data and the form of our dependent variable (see

[11] Meat Products, Tobacco and Food, Drinks, Textile Products, Leather and Shoes, Wood Products, Paper Products, Publishing and Graphic Arts, Chemical Products, Plastic materials and Rubber, Non-metallic minerals, Metallurgy, Metallic Products, Machinery & mechanical equipment, Office machinery & computing equipment, Electric machinery & equipment, Motor vehicles, Other transportation equipment, Furniture and Other manufacturing industries

Section 3.3), we will make use of an event history (i.e., a record of when this event occurred to the firms in our sample). The hazard probability conveniently conveys this notion of risk, as it reflects the probability of stopping downsizing, conditional on survival and covariates. In our case, the event can occur at any point in time, but the ESEE only collects whether the firms downsize in each year. Thus, we will apply the following discrete-time model.

We assume that time can take on only positive integer values (*t=1, 2, 3, ...*) and that we observe a total of *n* independent firms (*i=1, 2, ..., n)* beginning at some natural point *t=1*. The observation continues until time $t_i$, at which point either downsizing is stopped or the observation is censored. Censoring means that the company is observed at $t_i$ but not at $t_i$+1. It is assumed that the time of censoring is independent of the hazard rate for the occurrence of events. Also observed is a *Kx1* vector of explanatory variables $\boldsymbol{x}_{it}$, which may take on different values at different discrete times. We begin by defining the discrete-time hazard rate:

$$P_{it} = \Pr[T_i = t \mid T_i \geq t, x_{it}] \tag{1}$$

where *T* is the discrete random variable giving the uncensored time of event occurrence (i.e., stopping downsizing). $P_{it}$ is the conditional probability that the event occurs at time *t*, given that it has not already occurred.

The next step is to specify how this hazard rate depends on time and the explanatory variables. If one assumes that the data are generated by the continuous-time proportional hazards model[12], it has been shown (Holford, 1976) that the corresponding discrete-time hazard function is given by:

$$P_{it} = 1 - \exp\left[-\exp\left(\alpha_t + \beta' x_{it}\right)\right] \tag{2}$$

where the coefficient vector $\beta$ is a *Kx1* vector of constants and represents the effects of the explanatory variables on the probability of the event. Thus, if $x_1$ has a positive coefficient $\beta_1$, an increase in $x_1$ produces an increase in the likelihood that the event will occur. By assumption, these effects are constant over time. Note that $\alpha_t$ (*t=1,2,...*) is just a set of constants and collects the organizational experience in downsizing (hypothesis 1). Here, we apply a very general way to account for duration in downsizing: the inclusion of temporal dummy variables —i.e., by specifying interval-specific (annual)

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[12] The functional form of the proportional hazards model in continuous form is: $\log\lambda(t,x) = \alpha(t) + \beta' x$, where $\alpha(t)$ is an unspecified function of time, $\beta$ is a *Kx1* vector of constants, and λ(t,x) is the hazard rate, which can be defined as: $\lambda(t) = f(t)/[1 - F(t)]$, where f(t) is the probability density for *T,* and *F(t)* is the cumulative distribution function for *T.* It is called the proportional hazards model because the ratio of the

dummies ($\alpha_t$), with one for each year at risk. Therefore, this implies a fully non-parametric baseline hazard. Because the method does not specify a functional form for the baseline hazard, it is more robust than parameter approaches. Parametric models rely on fully specifying the base-line hazard. However, the chosen functional form may not be valid and it is particularly vulnerable to problems caused by unobserved heterogeneity across firms (Jones 2005).

Equation (2) may be solved to yield the so-called complementary log-log function:

$$\log[\log(1 - P_{it})] = \alpha_t + \beta' x_{it} \tag{3}$$

The likelihood of the data may be written as follows:

$$L = \prod_{i=1}^{n} [\Pr(T_i = t_i)]^{\delta_i} [\Pr(T_i > t_i)]^{1-\delta_i} \tag{4}$$

where $\delta_i$ is a dummy variable which equals 1 if the observation is uncensored and zero if censored.

Each of the probabilities in (4) can be expressed as a function of the hazard rate. Using elementary properties of conditional probabilities, it can be shown that:

$$\Pr(T_i = t) = P_{it} \prod_{j=1}^{t-1} (1 - P_{it}) \tag{5}$$

$$\Pr(T_i > t) = \prod_{j=1}^{t} (1 - P_{it}) \tag{6}$$

Substituting (5) and (6) into (4) and taking the logarithm yields the log-likelihood function:

$$\log L = \sum_{i=1}^{n} \delta_i \log\left(\frac{P_{it_i}}{1 - P_{it_i}}\right) + \sum_{i=1}^{n} \sum_{j=1}^{t_i} \log(1 - P_{ij}) \tag{7}$$

At this point one can substitute the appropriate regression model for $P_{it}$ (equation 3) and then proceed to maximize log$L$ with respect to $\alpha_t$ ($t=1, 2, 3, ...$) and $\beta$. Allison (1984) and Jenkins (1995) show that —by defining the dummy variable $y_{it}$ equal to 1 if firm $i$ stops downsizing at time $t$, otherwise zero— (7) can be rewritten as:

$$\log L = \sum_{i=1}^{n} \sum_{j=1}^{t_i} [y_{it} \log P_{ij} + (1 - y_{it}) \log(1 - P_{ij})] \tag{8}$$

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hazard rate for any two companies at any point in time is a constant over time. See Allison (1982) for further details.

which is the log likelihood for the regression analysis of dichotomous dependent variables (Cox, 1970; Hanushek and Jackson, 1977; Nerlove and Press, 1983). Thus, the discrete-time hazard model described above can be estimated using programs for the analysis of dichotomous data.

Finally, accounting for unobserved heterogeneity is particularly important. Recall, for instance, that according to constraining and cloning forces (Section 2.1), firms tend to copy-cat other firm's downsizing practices. However, the ability to do this must necessarily be left out of the empirical model proposed because it is immeasurable[13]. This way, unobserved heterogeneity will be induced in the model as such covariate is not included in the model's specification. This can lead to problematic inferences in so far as parameter estimates can be inconsistent. Consider the case where there are two types of firms: "frail" companies which have a high (but constant) hazard rate and "strong" companies which have a low (but constant) hazard rate. The two groups may be equally mixed in the population to begin with, but over time the frailer companies will tend to stop downsizing first, leading to an unequal mix. As time passes, the proportion of frail companies will decrease and the overall hazard will decrease. If it is not possible to control for the heterogeneity between the two types of firms, this will give the appearance of a decreasing hazard over time. We thus deal with unobserved heterogeneity by introducing into the hazard rate an additional random parameter that amounts for unobserved heterogeneity (Hougaard, 2000). This way, we treat unobserved heterogeneity non-parametrically, by assuming that the unobservable error term has a discrete distribution characterised by a set of mass points, where the value of these mass points and the probabilities attached to them are estimated as part of the maximum likelihood estimation (Heckman and Singer, 1984)[14].

## ESTIMATION RESULTS

Table 3 shows the estimation results for the discrete time hazard model presented previously. Model 1 differs from Model 2 in that the former includes the return on sales (ROS), while the latter makes use of the return on assets (ROA) as the measure for corporate performance. To check whether the number of mass points is robust as regards the specification with unobservables, three alternative information criteria were

[13] Moreover, the standard measure of mimicry (the percentage of firms in an industry that have downsized) cannot be added as an explanatory variable, since it precisely represents the hazard rate at each time interval (see Section 3.2).

[14] Alternatively, unobserved heterogeneity can be dealt with by parametrically (i.e., by specifying a parametric distribution for the unobserved heterogeneity such as a normal, gamma distribution, etc.). However, this approach has been criticised by Heckman and Singer (1984), as the unobserved

applied: the Akaike information criterion, the Hannan-Quinn criterion and the Bayesian information criterion. All information criteria lead to the same conclusion: in any model specification where firm unobserved heterogeneity is taken into account, including two mass points did not improve the model fit.[15] Thus, as we cannot reject the null hypothesis that unobserved heterogeneity is relevant, the estimated models do not include any mass points: our comments will be based on the models where unobserved heterogeneity is not taken into account.

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Insert Table 3 about here

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The discrete-time hazard models include two types of parameters. On the one hand, those representing the baseline hazard function (i.e.: the time indicators: *Year1, ..., Year6*) —see the previous section. On the other hand, the remainder of the parameters represent the hypothesized influence of each predictor on the hazard rate. The sign on each of these latter coefficients indicates the effect on the hazard rate out of downsizing. That is, a negative (positive) coefficient has a positive (negative) effect on the duration.

**The time indicators**

Note that unlike the familiar regression model, Models 1 and 2 contain no single stand-alone intercept[16]. Instead, the parameters (*Year1,... Year6)* act like multiple intercepts —one per time period—, indicating the value of the outcome in each particular period. We can interpret these parameters as intercepts because of the way we have defined the time indicators. In the sixth year, for example, only *Year6=1*, so that all other terms (*Year1,..,Year5*) disappear, leaving the population value of the hazard in the 6$^{th}$ year to be its estimated coefficient. Taken together, these parameters represent the estimated baseline hazard function. The amount and direction of variation in their values describe the shape of this function and tell us whether risk increases, decreases or remains steady over time. The estimated baseline hazard is non-significant in Model 1: therefore, in this model, the risk of stopping downsizing is unrelated to time. However, in Model 2, the estimated time indicators become significant for every year except for *Year2* and *Year6*: the baseline hazard declines up to the fourth year, and then slightly increases. Thus, according to Model 2, the risk of stopping downsizing significantly decreases over time

heterogeneity distribution is unknown. These authors show that parametric-form assumptions for unobserved heterogeneity might be biased when the chosen distribution is incorrect.

[15] Results are available upon request.

up to the fourth year (which offers support for hypothesis 1). Figure 1 plots its values (calculated for sample means at all covariates, except for those capturing the time indicators). As can be observed, in year 2 the fitted hazard probability reaches its maximum (0.4817), and then falls to a minimum of 0.3513 in Year 4.

**The remainder of estimated coefficients**

The proportion of temporary workers is a statistically significant variable, as it significantly increases the hazard rate. Therefore, firms with a higher proportion of temporary workers are less likely to continue cutting the size of their permanent workforce. We may conclude, therefore, that fixed-term contracts raise the flexibility of firms: when the need arises to continue downsizing —which may be the case when the firm faces a severe downturn as opposed to a short-term fluctuation— varying the peripheral workforce can help to save costs and to accelerate employment adjustment. These results, thus, offer support for the core-periphery hypothesis (hypothesis 3).

On the contrary, employment termination costs (as a proportion over total personnel costs) present a significant negative impact on the decision to continue reducing permanent work force size. These costs are associated with a lower propensity by firms to stop downsizing —this result does not support hypothesis 2. Thus, in spite of the institutional features of the Spanish labor market —which gives workers strong employment rights, and therefore, imposes important constraints upon employers' downsizing behavior— job security regulation need not inhibit the decision of employers to continue downsizing, suggesting that the impact of dismissal related costs is relatively insubstantial. This result is in line with studies on the effects of firing costs on employment adjustment, which do not support the conclusion that firing costs slow firms' decision to adjust employment levels (e.g., Abraham and Houseman, 1994; Hunt, 2000). Rather, it is as if despite incurring employment termination costs, firms still needed to adjust their work force by getting rid of the least productive workers (Toharia and Malo, 2000).

Finally, we find that large firms survive longer in downsizing than small firms. This occurs for firms with more than 50 employees. Indeed, the hazard rate is lower as firm size is larger. Thus, once downsizing has begun, larger firms have a larger propensity to continue with personnel reductions, which offers support for hypothesis 4. And both measures of profitability (ROS and ROA) exert a positive impact on the hazard rate out of downsizing, which offers support for hypothesis 5.

[16] Some readers may be more familiar with a specification that includes a stand-alone intercept and excludes one of the time indicators. This alternative specification, although identical in fit to the

As regards control variables, the likelihood of stopping downsizing increases with the value added to employee ratio, although only in Model 2. On the contrary, when demand shortfalls are experienced due to an economic recession (which is likely to be affecting more or less all firms in the sample), continuation of downsizing is more compelling. Thus, experiencing performance difficulties due to market trends is a relevant explanatory factor of the length of on-going downsizing efforts. On the contrary, the regional unemployment rate presents a positive impact on the hazard rate. This may be explained by the fact that regions with a higher unemployment rate are characterized by a larger presence of temporary workers so that, instead of getting rid of permanent workers, an alternative might be simply getting rid of temporary workers. Finally, the estimated coefficients for age show that firms whose year of incorporation is between 1975 and 1985 face higher chances of failure (that is, of ending their downsizing spell). This result underscores the firm's lifecycle as an important factor behind downsizing decisions (Coucke, Peenings and Sleuwagen, 2007): as eldest firms facing more competitive pressure and operating in mature markets have to focus on cost reduction, it may be more profitable for them to extend their downsizing practices over time.

## CONCLUSIONS

The 1980s and 1990s witnessed unprecedented levels of restructuring. In order to survive, companies had to cut costs by closing down operations, radically reorganizing work processes, and reducing their workforces throughout the ranks of the organization. Such intense change processes were often conducted under the banners of reengineering, lean management and downsizing. In this paper, we have used Spanish manufacturing data (the Survey on Business Strategies) to investigate the determinants of firms' duration in downsizing.

The analysis performed has found some important drivers of downsizing duration. In particular, results have offered support for the core-periphery hypothesis, in so far as firms with a high proportion of temporary workers are less likely to continue reducing the size of its permanent workforce: thus, fixed-term contracts raise the flexibility of firms, since varying the peripheral workforce instead of the core workforce helps to save employment adjustment costs (especially when the environmental context is characterized by economic or industry difficulties). In addition, continuation of downsizing is negatively associated with a recessive trend in the market, which

specification we present, precludes the simple interpretation of the coefficients for *Year1,.. Year 6*.

confirms corporate demand as a significant explanatory factor of downsizing practices found in previous studies. Moreover, strong support has been offered as regards firm size as a stimulus for longer downsizing duration: large firms continue downsizing for longer than small firms.

Our results show that, on average, downsizing spells are rather short (the median company in our dataset downsizes for only 1.4 years). This result is relevant, in so far as since the granting of regional autonomy in 1982, the Spanish Government has distributed massive subsidies in order to rescue companies in economic difficulties which have been downsizing for long. However, spending time and money in rescuing threatened companies in order to prevent their collapse has negative outcomes[17]. Therefore, the shorter downsizing spells are, the less negative outcomes will arise in this sense.

In addition, we have found that downsizing duration is positively associated with the magnitude of employment termination costs. This result is contrary to the theoretical expectation, since, given that laws in Spain give workers strong employment rights (including the right to advance notice of layoff and the right to severance pay and other redundancy compensation), employers in this country are expected to shorten the spell of downsizing insofar as this implies incurring larger costs in labor adjustment. On the contrary, our findings indicate that strong employment security need not inhibit employers' downsizing behavior. This result is in line with studies on the effects of severance costs on employment adjustment which do not support the conclusion that severance costs slow a firm's decision to adjust employment levels.

Finally, our findings indicate that the length of time a firm has downsized presents a negative impact on the likelihood of continuing to downsize for longer. In particular, from the second year of experience in downsizing, a substantial proportion of companies go on with the implementation of downsizing, although, from the data at hand, it is impossible to evaluate whether institutional or organizational learning concerns are behind this pattern. However, given that this result has been found not to be robust enough, we conclude that a replication in Spain of the pattern observed in the United States (where corporate persistence in downsizing is frequent) does not seem to be very common. This conclusion is reinforced by the finding that the magnitude of the implemented reduction does not shorten the downsizing duration.

[17] Indeed, there has been a change of investment policy in recent years which have involved finding other investors in the private sector or handling failed companies over to cooperatives formed by groups of redundant workers (see Toharia and Ojeda, 1999).

Although it is beyond the scope of this study to assess whether downsizing was effective and sufficient to meet the companies' current goals, our work suggests that Spanish companies may have learned from the U.S. experience that the organizational and human costs of insufficiently well-planned downsizing are high, so that carefully planned strategies need to be devised. On the other hand, given that downsizing practices are anchored in a particular legal or cultural framework and are, therefore, not directly applicable in another setting —particularly laws on dismissals and the involvement of work committees (which differ between countries) — the findings may reflect European laws and traditions rather than the outcome of learning through observation from the U.S. The legislative context in western continental Europe — which provides workers with far greater protection from redundancies than in the U.S. — probably contributes to the fact that if companies need to further downsize in Spain, they may opt, instead, for maximizing alternatives to layoffs by redeploying employees to other parts of the company or changing work-time practices. These results are sensible insofar as repeated downsizing —which is empirically rare, as we have shown— may represent a significant change among Spanish companies, tending to call into question organizational values, norms, and processes that are usually widely accepted and deeply engrained. As downsizing implies (particularly in Europe) shifting from the basic assumption of job security to recognizing that stable employment is no longer guaranteed, many companies downsizing the workforce at all levels may be, therefore, having to re-work their understanding of their world and their role and relationships within the system. Apart from being costly, this is time-consuming, insofar as at the organizational level it essentially means that the implicit contract with its members needs to be redefined.

## APPENDIX A: Procedures for employee reductions by employers in Spain

*Worker dismissals*

There are two basic ways through which any employer may adjust its workforce: (i) not renewing temporary contracts; and (ii) dismiss, either individually or collectively, some of its permanent workers. Permanent contracts may only be terminated, under Spanish law, according to legally defined causes (unfair dismissals can be very expensive. Indeed, if an employer terminates such contract without good cause (see below) the employee will be entitled to receiving a severance compensation based on 45 days of salary per year of service in the company capped at 3 and ½ years of salary (which corresponds to more than 28 years of service). On the one hand, if the size of the adjustment is large enough —meaning roughly 10 percent of the workforce— the employer has to negotiate a procedure called *Expediente de regulacion de empleo* with the workers (which includes the amount of severance pay, for which the law only establishes a minimum). Redundancy payments in Spain are calculated at 20 days' pay per year of service, up to a maximum of 12 months' pay. Likewise, when a collective (or objective) dismissal is found to be unjustified, the compensation amounts to 45 days' pay — except for "promotion contracts" when the unfairly dismissed worker receives the equivalent of 33 days' pay. On the other hand, if the size of the required adjustment does not meet the criteria to be considered collective, firms may initiate an individual dismissal procedure which may take the form of (i) an "objective" dismissal —meaning a dismissal on the grounds of economic or technological circumstances; i.e., objectively justified— or (ii) a disciplinary dismissal. The latter are usually preferred by firms because there are fewer requirements involved (no advance notice is required and no initial severance payment has to be deposited; however, the employer faces a financial risk in case of a disciplinary dismissal to be unfair of 45 days of salary per year of service). In objective dismissals, if the motives for dissolving the contract are accredited, the severance paid to the employee should be equivalent to 20 days' salary per year worked, up to a maximum of one year's pay—otherwise, if the company can not accredit the reason for the termination, or breaches the formal and procedural communication requisites, it will have to opt to either pay the employee severance pay equivalent to 45 days' salary per year worked, up to a maximum of 42 monthly payments, or to readmit the employee under the conditions in place prior to dismissal.

*Early retirement and voluntary severance packages*

The Law contemplates two early retirement formulae: early retirement at the age of 52 and reduced-rate early retirement — while others form the subject of collective bargaining. As a means to adjust employment, early retirement is rather widespread nowadays. It is only scarcely the result of a voluntary decision by the worker; instead, it is a frequent consequence of employment adjustment processes. Pensions are usually reduced in an extent dependent on both workers' labor market experience and their distance to the statutory retirement age (65 years-old). However, these agreements cover the possibility that in the event of crisis accords or "social plans" —created in order to manage and cushion the consequences of collective dismissals or in the case of collective contracts involving firms affected by over-manning— the employer may agree to pay a sum equivalent to the old age pension, until the worker reaches the age of 65, a system quite common in Spain (Toharia and Ojeda, 1999). Thus, these incentives induce elderly workers to exit the labor force before they reach the age of 65, and serve to protect workers who get jobless when firms implement collective dismissals. In fact, it is frequent for dismissed individuals in case of being above 52 years-old and after the exhaustion of contributory unemployment benefits, to be entitled to receiving assistance benefits up to the early retirement age. Apart from early retirement programmes (which are frequently offered in restructuring, since employers are obliged by law to offer measures designed to alleviate its social effects), negotiated alternatives between companies and work councils may include part-time work programmes, transfers to other locations of the same firm and "voluntary severance programmes". The use of voluntary departures as a means to cushioning redundancy is extremely widespread (there is no age limit established). Voluntary severance incentives are offered to reduce head count through self-selection. These incentives can include continuation of compensation for a specified period of time, a one time lump-sum payment or maintenance of certain benefits paid for by the company. Benefits often consist of life or health insurance, memberships, educational assistance and so on.

## APPENDIX B: Main descriptive statistics

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Censored observations (1=Yes) | 0.619 | 0.486 | 0.000 | 1.000 |
| Percentage reduction in total workforce at current year | 12.299 | 14.928 | 0.137 | 100.000 |
| Percentage ratio of (Employment termination costs/Total personnel costs)[b] | 2.224 | 5.437 | 0.000 | 68.719 |
| Foundation year (dummy variables): | | | | |
| <1960 | 0.186 | 0.390 | 0.000 | 1.000 |
| ≥1960 & ≤1975 | 0.248 | 0.432 | 0.000 | 1.000 |
| >1975 & ≤1985 | 0.189 | 0.392 | 0.000 | 1.000 |
| >1985 | 0.376 | 0.484 | 0.000 | 1.000 |
| Log(Average degree of capacity utilization) | 4.385 | 0.206 | 2.996 | 4.605 |
| Market in recession (1=Yes) | 0.222 | 0.416 | 0.000 | 1.000 |
| Market addressed by firm is (dummy variables): | | | | |
| Increasing | 0.218 | 0.413 | 0.000 | 1.000 |
| Constant | 0.629 | 0.483 | 0.000 | 1.000 |
| Diminishing | 0.154 | 0.361 | 0.000 | 1.000 |
| Log(Ratio of labor costs over sales) | -2.133 | 1.040 | -4.925 | 0.098 |
| ROS | 8.379 | 12.687 | -165.900 | 53.700 |
| ROA | 12.634 | 18.550 | -157.258 | 349.164 |
| Value Added per Employee | 42.475 | 30.457 | -35.810 | 327.322 |
| Ratio of (Temporary workers/total number of employees) | 0.149 | 0.187 | 0.000 | 1.000 |
| Leverage | 0.118 | 0.153 | 0.000 | 0.847 |
| Liquidity | 10.515 | 50.644 | 0.000 | 1535.919 |
| Above 50 percent of capital owned by a foreign company (1=Yes) | 0.337 | 0.473 | 0.000 | 1.000 |
| Above 50 percent of company's capital is publicly owned (1=Yes) | 0.486 | 0.500 | 0.000 | 1.000 |
| Type of ownership (dummy variables): | | | | |
| Individual owner | 0.009 | 0.095 | 0.000 | 1.000 |
| Public Limited Company | 0.675 | 0.469 | 0.000 | 1.000 |
| Limited Company | 0.274 | 0.446 | 0.000 | 1.000 |
| Cooperative | 0.038 | 0.192 | 0.000 | 1.000 |
| Other | 0.005 | 0.067 | 0.000 | 1.000 |
| Regional unemployment rate | 13.664 | 6.341 | 4.710 | 34.240 |
| Firm size (expressed as total number of employees; dummy variables): | | | | |
| ≤ 50 | 0.461 | 0.499 | 0.000 | 1.000 |
| >50 & ≤ 100 | 0.089 | 0.285 | 0.000 | 1.000 |
| >100 & ≤ 200 | 0.120 | 0.325 | 0.000 | 1.000 |
| >200 & ≤ 500 | 0.213 | 0.409 | 0.000 | 1.000 |
| >500 | 0.117 | 0.321 | 0.000 | 1.000 |

Sample size: 1,985. No. of firms: 1,188.

[a] All variables derived from the Spanish Survey of Business Strategies and own author's calculations, except for the regional unemployment rate (source: Spanish Labor Force Survey, INE).

[b] Employment termination costs are defined as the sum of severance, early retirement and voluntary severance pay.

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**FIGURE 1.** Sample and predicted hazard

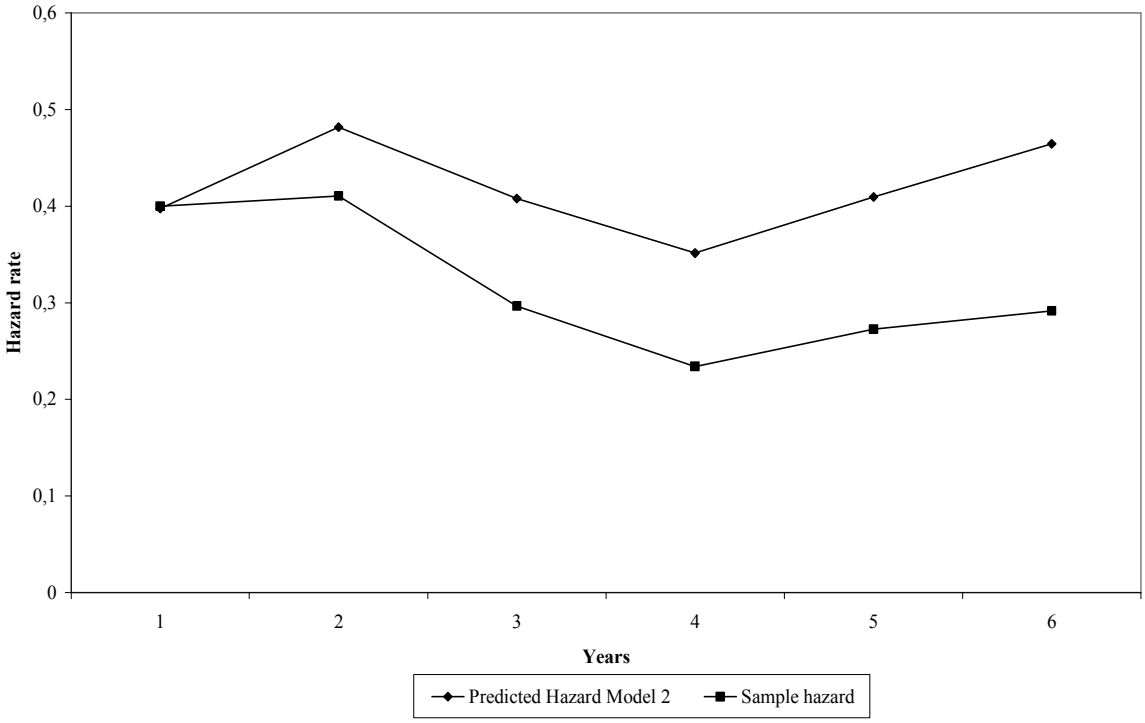

**TABLE 1.** Life table describing the number of years in downsizing

| | Numbers | | | Proportion of | |
|---|---|---|---|---|---|
| Year | Downsizers at the beginning of the year (Risk set) | Who stopped downsizing during the year | Censored at the end of the year | Firms at the beginning of the year who stopped downsizing during the year (Hazard function) | All companies still downsizing at the end of the year (Survival function) |
| 0 | 1188 | - | - | - | 1.000 |
| 1 | 1188 | 475 | 260 | 0.3998 | 0.600 |
| 2 | 453 | 186 | 85 | 0.4106 | 0.354 |
| 3 | 182 | 54 | 34 | 0.2967 | 0.249 |
| 4 | 94 | 22 | 28 | 0.2340 | 0.191 |
| 5 | 44 | 12 | 8 | 0.2727 | 0.139 |
| 6 | 24 | 7 | 17 | 0.2917 | 0.098 |

**TABLE 2.**Example of Discrete Time Event History Data

| Case I.D. | Dependent Variable: Event Ocurrence | Year | Time Elapsed |
|---|---|---|---|
| 1 | 0 | 1994 | 1 |
| 1 | 0 | 1995 | 2 |
| . | . | . | . |
| . | . | . | . |
| . | . | . | . |
| 1 | 1 | 1999 | 6 |
| 2 | 0 | 1997 | 1 |
| 2 | 1 | 1998 | 2 |

**TABLE 3.**Maximum likelihood estimates (discrete time proportional hazard model)

| | Model 1 | | | Model 2 | | |
|---|---|---|---|---|---|---|
| **Determinants** | **Coeff.** | **Std. Error** | **Signif.** | **Coeff.** | **Std. Error** | **Signif.** |
| Duration dependence (dummy variables): | | | | | | |
| Year 1 | -1.885 | 1.312 | | -2.357 | 1.318 | ** |
| Year 2 | -1.627 | 1.312 | | -2.096 | 1.317 | |
| Year 3 | -1.836 | 1.318 | | -2.323 | 1.323 | * |
| Year 4 | -2.061 | 1.326 | | -2.514 | 1.333 | * |
| Year 5 | -1.803 | 1.366 | | -2.318 | 1.372 | * |
| Year 6 | -1.641 | 1.402 | | -2.147 | 1.406 | |
| % Reduction in total workforce | -0.006 | 0.004 | | -0.007 | 0.004 | |
| % Ratio of (Employment termination costs/Total personnel costs) | -0.034 | 0.020 | * | -0.036 | 0.020 | * |
| (% ratio of Employment termination costs/Total personnel costs)$^2$ | 0.001 | 0.001 | | 0.001 | 0.001 | |
| Foundation year (dummy variables): | | | | | | |
| <1960 | - | - | - | - | - | - |
| ≥1960 & ≤1975 | 0.256 | 0.171 | | 0.257 | 0.170 | |
| >1975 & ≤1985 | 0.340 | 0.187 | * | 0.375 | 0.187 | ** |
| >1985 | 0.031 | 0.176 | | 0.019 | 0.176 | |
| Log(Average degree of capacity utilization) | 0.033 | 0.267 | | 0.103 | 0.265 | |
| Market in recession (1=Yes) | -0.349 | 0.149 | ** | -0.350 | 0.149 | ** |
| Market addressed by firm is (dummy variables): | | | | | | |
| Increasing | - | - | - | - | - | - |
| Constant | -0.158 | 0.128 | | -0.171 | 0.127 | |
| Diminishing | -0.065 | 0.195 | | -0.051 | 0.194 | |
| Log(Ratio of labor costs over sales) | -0.016 | 0.071 | | -0.015 | 0.071 | |
| ROS | 0.027 | 0.006 | *** | - | - | - |
| ROA | - | - | - | 0.015 | 0.004 | *** |
| Value Added per Employee | 0.002 | 0.002 | | 0.005 | 0.002 | ** |
| Ratio of (Temporary workers/total number of employees) | 2.144 | 0.335 | *** | 2.195 | 0.334 | *** |
| Liquidity | 0.078 | 0.354 | | 0.103 | 0.351 | |
| Current ratio | -0.003 | 0.002 | | -0.002 | 0.002 | |
| Above 50 percent of capital owned by a foreign company (1=Yes) | 0.111 | 0.125 | | 0.108 | 0.125 | |
| Above 50 percent of company's capital is publicly owned | -0.500 | 0.107 | *** | -0.499 | 0.107 | *** |
| Type of ownership (dummy variables): | | | | | | |
| Individual owner | - | - | - | - | - | - |
| Public Limited Company | 0.952 | 0.576 | * | 1.053 | 0.605 | * |
| Limited Company | 1.136 | 0.580 | ** | 1.255 | 0.608 | ** |
| Cooperative | 0.947 | 0.629 | | 1.043 | 0.654 | |
| Other | 1.029 | 0.933 | | 1.108 | 0.952 | |
| Regional unemployment rate | 0.031 | 0.011 | *** | 0.030 | 0.011 | *** |
| Firm size (dummy variables): | | | | | | |
| ≤ 50 | - | - | - | - | - | - |
| >50 & ≤ 100 | -0.549 | 0.194 | *** | -0.507 | 0.194 | *** |
| >100 & ≤ 200 | -0.760 | 0.188 | *** | -0.739 | 0.188 | *** |
| >200 & ≤ 500 | -0.886 | 0.165 | *** | -0.873 | 0.166 | *** |
| >500 | -1.182 | 0.219 | *** | -1.147 | 0.220 | *** |
| Log-Likelihood | | -1149.8262 | | | -1153.5147 | |

**Notes:** * p<0.10; ** p<0.05; *** p<0.01. Estimations also include controls for industries. Sample size=1,985 observations.