Workforce Reduction and Firm Performance:

Evidence from French Firm Data

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Abstract

Using a large annual data base of French firms (1994-2000), this article examines the determinants of a workforce reduction of publicly-listed and non-listed companies and their consequences on firm performance. Firstly, workforce reduction appears to be a defensive response to an adverse economic shock. However, publicly-listed firms anticipate better than the others the decision to cut jobs. Secondly, using a Difference in Differences model, the estimates indicate that there has been a very small but significant improvement in the major performance indicators of the non-listed companies. For listed-companies, the estimates are no significant.

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1 Introduction

In this paper we will use alternatively workforce reduction, downsizing or layoff. The reason is that in France, there is no institutional difference between layoff and downsizing since a layoff implies a permanent separation with workers.[1] Although we are aware of the subtleties of defining organizational downsizing, we adopt the notion commonly accepted by the scholars Cascio 1993; Freeman& Cameron (1994: 12) and most of the academics, including DeWitt, 1998; De Meuse and al. 1994; Budros (1999: 70). They define downsizing as an intentional policy involving a reduction in the workforce to improve the firm's efficiency. As Cameron (1994: 194) pointed out: "downsizing may be reactive and defensive, or it may be proactive and anticipatory."

Baumol, Blinder & Wolff (2004: 5) pointed out the lack of empirical studies on the effects on a workforce reduction on firm performance. Moreover, the few empirical studies highlight their "conflicting findings" (Wayan & Wermer 2000: 343-344). Some papers conclude that downsizing improves economic performance, reducing the labour costs. Others report either equivocal outcomes or mixed results Cappelli and al. 1997; Baumol, Blinder & Wolff (2004: 194-197) or negative effects Cascio 1993: 100 ; Cameron 1994 ; Mishra & Spreitzer 1998. So, it has not been clear whether downsizing does indeed improve economic performance. As a result, firms either have a hazy idea of the consequences of downsizing or think that its impact is generally negative.

[1]It is an important difference with the U.S. In a layoff the worker is asked to temporarily leave during periods of weak demand, but will be asked back when business picks up. However as Cappelli (2000: 3) pointed out layoff is associated with shortfalls in demand while downsizing consists of 'reductions in jobs driven by the desire for operating efficiencies'.

This paper adopts a complementary approach, focusing on the statistical methods that have been underestimated. They may be another source of diversity of outcomes. In actual fact, several statistical shortcomings undermine their reliability. Firstly, the choice of samples in the previous studies are so limited in their size (the largest is the Standard and Poors index) that no serious conclusions can be drawn. Secondly, in order to analyse the impact of downsizing on firms' performance, some papers compare the average profitability growth between companies that have or have not reduced their workforce. They implicitly assume that the consequences of a workforce reduction are not contingent upon the initial characteristics of the firms that downsize. In so doing, these studies entail an important selection bias. Thirdly, most of the research deals with big firms. They never draw the distinction between publicly listed and non-listed companies. If we assume that workforce reduction policy lies in the domain of corporate governance depending on the distribution of power between shareholders and stockholders,then the causes of a workforce reduction and - as a consequence - the economic performance of list and non-lited firms should be different.

The paper is organised as follows. Section 2 reviews the previous research on the economic effects of a workforce reduction. Section 3 describes the database we built. Section 4 outlines the econometric strategy. Section 5 analyses the determinants of workforce reduction in 1996, the reference year chosen for this research. Section 6 is devoted to estimating the impact of workforce reduction using a corrected Difference in Differences estimator. Some concluding remarks are offered in section 7.

2 The Economic Effects of a Workforce Reduction: A Review of the Previous Research Findings

Baumol, Blinder and Wolff consider themselves as the "the first economists who study downsizing" Baumol, Blinder and Wolff (2004:5). For the manufacturing sector, they find that downsizing has not contributed to productivity, contrary to others studies Baily, Bartelsman and Haltiwanger 1996; Collins and Harris 1999; and our findings.

According to the managerial literature, firms downsize for two opposite reasons, each of which has prevailed historically depending on the period concerned. First, in the 1980's, downsizing was a common strategic response to save failing companies who were losing market share to foreign firms, or suffering large falls in demand for their products Cameron & Whetten 1987; Freeman & Cameron 1993. However, the merger wave of the 1980's influenced the evaluation of firms and, as a consequence the downsizing strategy. Any company trading at a price-earnings multiple lower than the industry-wide multiple was viewed as undervalued or a poor-performer, and ripe for takeover. Moreover, shareholders considered that CEOs and executive management ought to be theirs servants. These above attitudes explain the change in the meaning of downsizing that characterized a second period in the mid 1990's. Urged by financial markets to increase their return on equity, even though they already enjoyed strong profits, large corporations embarked on internal restructuring, consisting in both reducing employment and taking financial actions such as selling non-performing assets or refocusing on core activities. These two reasons corresponding to two business periods (the eighties and the nineties) define two meanings of downsizing.

On the conceptual side, Cameron, Freeman and Mishra (1993) have clearly defined an offensive downsizing in three steps: (1) an intentional plan (2) which means a reduction in company's size, in terms of either its workforce or its assets (3) and whose purpose is mainly an increase in profitability. So offensive downsizing appears as a well-prepared strategy developed by the managers. [2]

On the contrary, a defensive downsizing signals an effort to check or attenuate a decline in profitability. Thus, layoffs are driven by changes in the product market and product demand, and constitute a defensive response by firms to avoid bankruptcy. Cappelli (2000) accurately sums-up these findings: the distinctiveness of an offensive downsizing, as opposed to a defensive downsizing, is that the job cuts do not necessarily appear to be driven by shortfalls in demand but are instead the consequence of a well-prepared management strategy.

On the empirical side, a first set of studies have examined the main predictors of downsizing. Budros (1999) outlined a general framework with both sociological and economic causes of downsizing. The latter are classified into two categories: internal inefficiency (oversized firms) or external pressures (shareholder value, deregulation). However, few studies have tried to measure explicitly the importance of these factors. Based on a sample of 297 firms, González and Vicente-Lorente (2000) concluded that for the period 1989-1994, defensive downsizing occurred among the largest Spanish firms, with low productivity levels, financial difficulties, and decreasing scale of activity. A second set of economic studies looks at the consequences of downsizing. The seminal work comes from De Meuse et al. (1994), but their sample of 57

[2] It also the Cascio's perspective. As it is explained at the beginning of his paper, Cascio (1993) asserted that downsizing is essentially a purposive strategy defined as 'the planned eliminations of positions or jobs' while Cameron (1994) stressed the positive impacts of downsizing on efficiency and productivity.

companies is so small that their results are hardly significant. Cascio, Young and Morris (1997) found some positive relationships between reduction in employment and financial performance. Interestingly, companies that combine employment downsizing with asset restructuring generate a higher return on assets. Albeit still scarce, studies on French accounting data also tended to suggest a positive outcome to restructuring. Using a sample of 90 large companies whose workforce has been reduced by more than 10 percent, Sentis (1998) showed that indebtedness decreased after a large workforce reduction. For d'Arcimoles and FakhFakh (1997), layoffs are profitable as they affect not only the workforce level, but also its structure. However, there are important statistical drawbacks to these previous estimates. The accounting standards used are not always satisfactory for evaluating the change in economic performance. For instance, one should compute the labour productivity per hour, not per capita, since the ratio of the yearly flow of output on a final reduced stock of workers overestimates the change in labour productivity.

3 Data and Descriptive Statistics

The empirical investigation is based on three data sets, providing us with labour, economic and financial information on French companies over the period 1994-2000. Note that these data sets are exhaustive, and are believed to cover all companies in their field of interest, as it is compulsory for French firms to provide this information. The BRN database (Bénéfices Réels Normaux) provides extensive accounting and fiscal data on operating profit, debt and equity for any company with sales turnover above 530,000 euros. More than 500,000 companies are included in the data set each year. The DADS database (Déclarations Annuelles de Données Sociales) gives information on the labour structure (wages, qualifications), and covers

more than 80% of employees. Financial Market data is provided by Euronext, for all listed companies[3] that were quoted during at least one year between 1994 and 2000.

The DADS data set is based on the plant level, from which we reconstitute the data at the firm level. Firms keep the same ID number, called Siren, throughout their economic life, allowing us to merge the BRN and DADS and to follow companies over the period of study. Finally, the Euronext dataset tracks the traded securities of listed companies, each stock being registered under a unique ID code, called Sicovam. For each traded security, we identify the firm it represents and build the link between the Sicovam and the Siren identifiers. Whenever several securities are related to the same firm, we only keep the most traded stock.

Our measure of workforce and employment is based on the average number of employees over the year[4]. We thus avoid the important accounting bias induced by a measurement of labour based exclusively on the end of the fiscal year. We then require that firms in our sample have a workforce of at least 20 employees in 1995. Doing so, we eliminate small companies for which the purpose of this study may be irrelevant. After filtering for influential data[5] and eliminating specific sectors[6], the final sample, named general set of companies or dataset A, has 62,798 observations, which have the same distribution over industrial sectors as the complete BRN data set. Note that one observation corresponds to one firm for which

[3]We do not include foreign companies when they do not have a regular economic activity in France, and do not exist in the DADS data set.

[4]Arithmetical average of the total number of employees at the end of each quarter, from the BRN. Note that the aggregate measure of employment we obtain does not record a displacement of employees between plants of the same firm as a decrease in workforce.

[5]We exclude observations corresponding to the first and last percentiles of economic and financial ratios.

[6]Companies from specific sectors, such as Agriculture, Energy, Real-Estate Property, Financial services, Government, Associations, are put aside, as they either do not fit with the purpose of this study or with the traditional accounting analysis.

statistical information is available for at least one year between 1994 and 2000. Only one fifth of these firms have available information for every year from 1994 to 2000, due to a high rate of bankruptcies, creations and mergers[7] Though most of them are already included in dataset A, we also analyse publicly-listed companies in a separate database, called dataset B. We include large French companies (quoted at the "Réglement Mensuel" and the "Marché au comptant") and medium-sized companies with a good record in accounting practices and key financial figures (quoted at the "Second Marché"). The final dataset records 417 observations in our reference year (1996).

We focus on the change in workforce between 1995 and 1996, this being our key variable used to distinguish between two groups of firms: employment downsizers and employment upsizers. Our variable includes both full-time and part-time jobs. However, firms could reclassify full-time positions into part-time positions, while our variable would fail to measure a decrease in workforce. We first address this concern: the share of part-time jobs in the total workforce actually decreased from 7.18% to 6.55% for employment upsizers and from 7.31% to 6.48% for employement downsizers. A Tukey's Studentized Range Test indicates that the difference between the two groups is not statistically significant at a 5% threshold. More generally, firms are allowed to reduce the working time instead of cutting the workforce. In such a case, our measure would be biased. We look at the change in the average number of hours worked per worker between 1995 and 1996. Firms were not reducing the number of hours instead of downsizing; On the contrary, in the case of listed companies the two working policies were used jointly. A total of 43.15% of the firms report using a workforce reduction

[7]Among the 62,798 observations, some firms are only present at the very beginning of the period and then disappear; other firms only appear after our reference year 1995-1996.

between 1995 and 1996. This part is of 43.08% for the non listed companies and of 53.98% for the listed companies. The intensity of the workforce reduction comparing the two sets of firms is another interesting descriptive variable. Taking into considaration only firms with workforce reduction, the proportion of strong reduction (more than 5%) averages 52.36% of non listed companies while the proportion of weak reduction is 47.64%. Listed companies report less strong reduction : 43.82%.

- The Profitability Ratios tell us whether a business is making profits - and if so whether it is at an acceptable rate.
  - *Return on Assets*: $ROA = \frac{\text{Net Profit before tax, interest and dividend (EBIT)}}{\text{Assets}}$
  - *Return on Equity*: $ROE = \frac{\text{Net Profit before tax, interest and dividend (EBIT) + Financial result}}{\text{Equity + Long-term debt}}$
- The Operating Ratios give us an insight into how efficiently the business is employing those resources invested in fixed assets and working capital.
  - *Profit Margin*: $Pmarg = \frac{\text{Net Profit before tax, interest and dividend (EBIT)}}{\text{Sales}}$
  - *Labour Productivity*: $Lprod = \frac{\text{Value added}}{\text{Total hours worked}}$
  - *Labour Cost*: $Lcost = \frac{\text{Wages + social contributions}}{\text{Total hours worked}}$
- The Liquidity Ratios indicate how capable a business is of meeting its short-term obligations as they fall due.
  - *Debt rate: Debt*$= \frac{\text{Long-term debt}}{\text{Equity + long-term debt}}$
  - *Long-term debt pressure: Lpres* $= \frac{\text{Long-term debt}}{\text{Total debt}}$
  - *Interest Cover: Icov* $= \frac{\text{Interests}}{\text{Sales}}$

- The Investment Ratio concentrates on the long-term health of a business.

  - *Investment effort: Effo* $= \frac{\text{Investments}}{\text{Fixed assets}}$

In addition, we include *financial market information* for publicly-listed companies, such as the change in stock price and the change in capitalisation (computed in consecutive years). Stock prices have been adjusted to take into account the change in the total number of shares[8]. We also use *labour information* regarding workforce: namely gender, qualifications (divided into four categories from the least qualified to the most qualified), age (four categories) and the weight of part-time work in the total workforce.

Depending on their change in workforce in 1996, companies are then divided into employment downsizers and employment upsizers.

4 Econometric strategy

Our variable of interest is the economic performance induced by the downsizing policy. Let Y_{it}^1 be one of our main economic indicators (for instance, the level of ROE in one year), where the superscript stands for the treatment status (1 if a downsizing programme has been adopted in 1995-96, 0 otherwise), and the subscripts i and t identify respectively the firm and the time period. Let T be a dummy variable with value $T_i = 1$ when the firm belongs to the group of downsizers. At time t after 1996, the average treatment effect over the treated population is:

$$\tau|_{T=1}^{true} = E(\tau_i|T_i = 1) = E(Y_{it}^1|T_i = 1) - E(Y_{it}^0|T_i = 1)$$

The problem of unobservability is summarised by the fact that we can estimate $E(Y_{it}^1|T_i = 1)$, but not $E(Y_{it}^0|T_i = 1)$. A natural way to cope with this problem is to use a Difference In

[8] Adjustment coefficients were provided by Euronext.

Differences (DID) estimator, whenever panel data on firms both before and after the treatment are available (at date t' and t):

$$\tau|_{T=1}^{simple} = E(Y_{it}^1 - Y_{it'}^1|T_i = 1) - E(Y_{it}^0 - Y_{it'}^0|T_i = 0).$$

This DID estimator is the one usually used in the management literature. However, we argue that this estimator is potentially biased when it does not include the characteristic of firms that influences their participation. In the simple case where the treatment effect is homogenous among participating firms, assume that $Y_{it} = g(X_i) + \tau T_i + \phi_i + \epsilon_{it}$, where ϕ_i is a fixed individual-specific effect and ϵ_{it} a temporary individual-specific fixed effect. Whenever the selection treatment is correlated with ϵ_{it} the DID estimator is inconsistent and approximates to

$$\tau|_{T=1}^{simple} = \tau|_{T=1}^{true} + E(\epsilon_{it} - \epsilon_{it'}|T_i = 1) - E(\epsilon_{it} - \epsilon_{it'}|T_i = 0)$$

This bias has been illustrated by the so-called Ashenfelter's dip in the case of earnings gain and training programmes. In our case, firms are more likely to adopt a downsizing treatment in 1996 if a temporary dip in profitability occurs the year before (for instance, if $Y_{it'}$ falls below a threshold $\underline{Y}$). Then a faster growth in indicators such as ROE and ROA is expected among those who downsize.

Our main contribution is first to consider observable variables that affect employment policy, such as the initial structural characteristics of the firms (in the economic, financial, labour and stock-market fields), and then to assess the importance of this temporary dip between 1995 and 1996. Conditioning on a large set of observable covariates X, we then assume that the remaining unobservable variables affecting employment policy (T) do not affect the change in economic performance (Y), and hence are not present in ϵ: $Y_{i1}, Y_{i0} \perp T_i|X_i, \forall i$.

Intuitively, this assumes that conditioning on observable covariates, we can take assignment to treatment as having been random. If we define

$$\tau_i|^{corrected}_{X_i,T_i=1} = E(Y^1_{it} - Y^1_{it'}|X_i, T=1) - E(Y^0_{it} - Y^0_{it'}|X_i, T=0)$$

Then using the distribution of covariates X, an unbiased estimator of $\tau|^{true}_{T=1}$ is given by $\tau|^{corrected}_{T=1} = E_{X_i}\left\{ \tau_i|^{corrected}_{X_i,T_i=1} \right\}$

We proceed in two steps. The first step consists in estimating a logit model explaining the probability that a firm is involved in a workforce reduction, both for the publicly-listed and non-listed companies. The logit model allows us to characterize the nature of the workforce reduction. The second step estimates the specific effect of such a strategy upon different performance indicators Y, using standard OLS[9] where the change in economic performance $Y_{it} - Y_{it'}$ is explained by the employment policy T and the set of variables X we included in the logistic estimate. We then eliminate insignificant variables in an iterative procedure, using a threshold of 10%, and we report the coefficient of T whenever the variable is significant. The OLS estimation is equivalent to a controlled Difference In Differences estimator. We use two different starting points for our estimates: 1995 and 1996, and we look for short-term (1995-96), medium term (1996-97) and long term (1996-2000) paths of performance variables. The short term differences are used to assess the dip in economic performance before the treatment. The medium and long term differences give a gross measure of the treatment effect. Finally, the net change in economic performance can be approximated as a difference between

[9] We have also used matching estimators, following the work of Rosenbaum and Rubin (1983); the propensity score of downsizing is then computed by the logistic estimate. The results are very similar to the OLS estimates, showing that we do not face a problem on heterogeneity or non-linearity. For a comparison of several evaluation methods, cf. Duflo (2002).

the gross change and the dip. Note that these estimates give the impact of employment policy on the *gap* between downsizing firms and other firms for each variable of interest, rather than on the *level* of these variables.

Our econometric strategy requires that labour, accounting and financial-market information is available both before and after the year when the workforce reduction occurs[10]. That is to say, we only keep firms that are still registered in the database from 1995 to 2000. Due to a high rate of bankruptcy and turnover, only 13,615 companies from the general dataset are used for both the logistic and OLS estimates, and 222 companies for the listed companies dataset.

5 Determinants of Workforce Reduction Differ in Listed and Non-Listed Companies

We run two different specifications for the logit model (Table 1). The first one includes a complete set of characteristics of firms, as well as information on workers and on financial markets (for the dataset B). Specifically, this estimate includes the size of the firm, different accounting data (profitability ratios, operating ratios, liquidity ratios, investment ratioS), labour characteristics (gender, qualification, age, weight of part-time work in the firm), and sectorial dummies. However, a large number of control variables can generate biases. To tackle this problem, the second estimate selects the more robust model. The procedure consists in dropping the less significant variables one after another, using a threshold of 10%.

[10]We discuss at the end of section 5 the problems raised by missing data and bankrupted firms and how this may affect our estimates.

5.1 Reducing Workforce as a Defensive Strategy for the Non-Listed Companies

We now focus on the results of the logit model for the general set of firms, using the second specification (column 2 of Table 1 reports the coefficients estimated).

Firstly, it appears that the probability of a firm being involved in a workforce reduction in 1996 increases with certain structural parameters, namely: 1/ the size of the firms (more than 500 employees in 1995: 0.6355); 2/ The proportion of older workers (more than 50 years old in 1995: 1.8823); 3/ The proportion of part-time workers in 1995 (0.2880). A large share of part-time workers is indeed a signal that the firm is using insecure jobs. 4/ The high level of the Herfindal index[11] (*hi_95*: 1.2167). Firms that were initially facing less competitive pressure were possibly oversized and had to adjust their workforce in 1996.

Secondly, the workforce reduction is correlated with a financial structure on the verge of bankruptcy. As expected, the probability of reducing the workforce is higher in companies characterised by a low level of Return on Equity (*ROE*:-0.4696), an increase in long term

[11] We first compute a Herfindhal index for each of the 600 sectorial activities in which companies are classified. For activity k, this index is computed as a ratio between the sum of squared sales done at the companies' level, and the square of the whole sales in this activity.

$$H_k = \frac{\sum_i (SALES_k^i)^2}{(\sum_i SALES_k^i)^2}$$

This index has a value between 1/Nk (where Nk is the number of companies in activity k) and 1. We then compute a index of the average competite pressure the firm has to face for the markets she is implemented in, as a weighted average of sectorial indexes H_k:

$$H^i = \sum_k \frac{SALES_k^i}{SALES^i} H_k \quad \text{where} \quad SALES^i = \sum_{k'} SALES_{k'}^i$$

debt pressure (*Lpress*: 0.2771) and an increase in insolvency (*interest cover*: 2.9983). Notice that this insolvency increases despite the leverage effect entailed by a reduction of firms assets ($\Delta Assets\_95$: -0.7519) in 1994-1995.

Thirdly, the cost of unskilled labour is not a significant predictor of workforce reductions. This suggests that downsizing stems from factors outside the firms, on the demand-side, such as the decline of sales (*sales turnover*: -1.2436). Hence, the employment reduction appears as a flexible and defensive response to a fall in sales and profitability. This last result is similar to one of the conclusions that Cappelli highlighted (2000: 21): "Excess capacity associated with shortfalls in demand has been seen as a main cause of layoffs." Note that due to the gloomy economic outlook, firms reduce employment in spite of a sustained productivity ($d1\_lpht$ = 0.2616). The rise in labour productivity is a necessary step before reducing workforce without a disorganisation of the production. However, a higher cost of the highly qualified workers decreases the probability of downsizing. Indeed, this variable acts as a dummy variable for the firms making enough profits to share them with the top management. This means that firms do not analyse the wages of highly qualified workers as a cost that should be reduced. Finally, the logistic regression does not show that publicly-listed or group-owned companies have a higher probability of reducing employment, which contradicts the hypothesis of shareholder-driven downsizing. However, this issue has to be studied in a separate logit estimation on publicly-listed firms.

5.2 Reducing the Workforce as a Way for Listed Companies to Improve their Financial Position

We now estimate the probability for a publicly-listed firm to be involved in a workforce reduction. The columns 3 and 4 in Table 1 display the results of a logit model that includes nearly the same dependent variables as those used in the previous model. However, two exceptions must be noted. Firstly, we exclude the variable *group* because all the publicly-listed companies belong to a group. Secondly, we include stock market-based variables: the change in capitalisation, a dummy variable indicating whether the firm's stock outperformed the *CAC40 index*[12], and a dummy variable *adjust* which indicates whether the stock price has been adjusted by the firm. Column 3 shows the estimate of the benchmark model while column 4 reports only the variables that are significant (threshold of 10%).

The share price adjustment is negatively correlated with a workforce reduction (*adjust_95*:-0.6365), as this variable may indicate important restructuring the year before, such as a merger or an acquisition, which usually leads to a change in the number and price of shares. Workforce reductions in 1996, primarily, are more likely to occur in firms whose competitiveness is undermined by the high labour cost of unskilled workers (*lchq1_95* : *1.7465*). Both a low share and low wages of highly skilled workers (*q3_95* : -1.9903, *lchq3_95* :-1.5967) indicate that firms where profits before interest and taxes are too low to be shared among the managers are more inclined to shed jobs.

[12]This index is made up of 40 shares, selected from the one hundred biggest companies listed on Euronext Paris, measured in terms of market capitalisation. As the CAC40 is the benchmark for Euronext Paris, it is widely used by portfolio managers to measure performance. In 1996, the CAC40 index fell by 9.09%. The dummy variable is computed as 1(Δ Share Price $>$ Δ CAC40)

Secondly, listed-companies are more likely to be involved in a workforce reduction when they have to struggle in a more competitive sector (*d1_ Hi95*=-0,3440), with an inadequate skill structure. For example, a low proportion of skilled workers (*q3_ 95*:-1.9903) at low cost (*lchq3_ 95*:-1.5967) increases the probability of laying off.

Finally, workforce reduction seems to be a strategic response to a poor financial position, rather than a poor economic one. Downsizers do face financial difficulties, such as a high level of debt-pressure and a low ROE (respectively *cper_ tendt95*: 0.6978, *ROE_ 95*: -4.7143). They deal with a high level of debt by reducing their assets in 1994-1995 (*d1_ assets_ 95*:-1.7709). However - and this is a major difference with the general set of firms - the demand side, as measured by sales turnover, is not a significant predictor.

6 Estimating the Impact of a Workforce Reduction

In Tables 2, 3 and 4, we report the impact of a workforce reduction (dummy variable T), for both the simple estimator (second column) and the corrected OLS estimator (third column). Each row indicates a different regression, where one of the economic indicators (first column) is explained by the dummy variable T for the simple estimator, and also a complete set of control variables for the corrected estimator[13].

For the general set of companies, workforce reduction improves labour productivity in the long run, up by +2.21% according to the simple estimator, though the OLS estimator gives a lower figure: only +1.21%. However, the *net gain* is a more accurate index because it includes the contemporary effects of *1995-1996*. Consequently, while the simple analysis

[13]the set of variables X we included is the same as those used in the logistic estimate. We then eliminate insignificant variables in an iterative procedure, using a threshold of 10%.

estimates the net gain of +2.21% between 1995 and 2000, most of the increase has vanished according to OLS estimator (+0.16%). Furthermore, improved productivity does not imply improved profitability, as the labour cost gap is significantly widened, though the increase is small in magnitude (the labour cost gap between downsizing firms and other firms is +0.39% or +0.50% higher in the short run).

Estimators provide very different results when it comes to the analysis of the financial position of firms. Basically, the simple estimator exhibits, after 1996, a buoyant growth in profitability (Return on Assets: +5.77 points, Return on Equity: +2.29 points in the long run) and a heightened Profit Margin (+0.74 points). Positive effects of workforce reduction are long-lasting: investment efforts increase (+2.72 points), meaning that firms become more confident about future prospects. However, there is no significant change in the long-term debt pressure or debt rate. Overall, the simple estimator would tip in favour of a successful offensive downsizing, with a positive impact of cutbacks on financial figures both in the short and the long run.

Conclusions drawn by the corrected estimator are definitely different. Between 1995 and 1996, while there is no significant effect on profitability according to the simple estimator, the OLS estimator gives the opposite picture, in which main financial indicators are strongly deteriorated, especially Return on Assets (-1.86 points) and Return on Equity (-1.87 points). Such a downturn should be attributed to a fall in demand. Therefore, cutbacks are consistent with a defensive model of downsizing. Once selection bias is corrected, most of the net gain in ROE and Profit Margin vanishes, meaning that firms that make large layoffs are no longer those that will have higher profitability growth.

Yet over the whole period studied from 1995 to 2000, the change in the ROA gap between the

two groups of firms is significant, with a net increase of 1.87 points. Such a net gain is not consistent with defensive downsizing, and calls for further investigation into the changes in assets and sales. Firstly, both the simple and corrected estimators indicate that the gap in assets increases over the long run, showing that downsizing firms follow a different pattern of asset capitalisation. One may have in mind a so-called "asset-light" strategy, which calls for the company to slow down its investments. Secondly, the gap in assets widens by more than the gap in sales (simple estimator: -8.57% vs -4.55%, OLS estimator: -5.26% vs -3.06%). Hence, employment downsizers managed to increase their average amount of sales per unit of capital more than employment upsizers. This gain in productive efficiency, three times smaller with the OLS estimator than with the simple estimator, is at the core of a net long-run increase in ROA.

For listed companies, the main result is that workforce reduction has no effect on future economic performance (ROE and ROA). However, the heightened labour productivity exhibited by the simple and OLS estimators exhibit, continues its ascending trend in 1997 and 2000 (respectively: +12.37% and +14,53%, OLS estimators), while labour costs grow more slowly (+9.14% in 1996-2000). This gap suggests that some profitability gains exist but they are not yet transformed into an increase in ROE. Finally, the changes in the structure of qualifications suggest that firms are always involved in restructuring processes, which does not allow us to draw significant and positive results, possibly because of a high variance in the results of our sample.

The results for listed companies can be compared to those found in Wayhan and Werner (2000) for a set of the 250 largest U.S. corporations. Basing their estimates on the changes in capitalisation and sales, the authors insist that the pressure stockholders place on listed

firms is a cause for downsizing. In our database, according to the logistic estimate, listed firms that downsized are also characterised by a low return on equity. However, their stocks did not significantly under-perform in the year previous to the workforce reduction. Finding a positive but fragile impact of workforce reduction on financial performance in the short run, Wayhan and Werner argue that workforce reduction could lead to a lower cost structure, which is leveraged into a competitive advantage by the firm's management. On the contrary, our OLS estimates show an increase in labour cost and consequently no positive change in profitability. So far, our corrected estimates are based on firms for which data is available until 2000. One question arises about the meaning of missing data points: of the companies that were present in our general data set in 1995 with at least 20 employees, 5.89% are missing in 1997 and 13.41% in 2000. Firstly, we test the logical relationship between disappearing from dataset A, and the initial characteristics of companies (Table 5). As expected, a higher probability of being absent is linked with poor financial performances, such as a low level of return on equity and a decreasing profit margin. Poor profitability combined with a gloomy outlook have driven these firms into financial distress and bankruptcy. Listed companies included in dataset A are less likely to be driven into bankruptcy, which is consistent with our results in section 4. Note that firms belonging to a group are more likely to disappear from the dataset. This might indicate that these firms have merged with other entities within the group. In this case, we cannot easily assess the bias that might be generated on our previous estimates, as these firms could be in either good or bad financial shape.

We thus leave aside the discussion of mergers and focus on the more severe problem of bankruptcy for missing firms that do not belong to a group. As firms that reduced their employment are twice as likely to face bankruptcy, according to our data, our previous OLS

estimates based on surviving firms may be upward biased[14]. Therefore, for the three key profitability ratios (ROA, ROE and Profit Margin), we estimate a lower-bound for the impact of workforce reduction by including reconstructed data that were previously missing. That is, where some data are missing we input values that firms would have been likely to exhibit if they had survived[15]. Then we run OLS estimates on the corrected dataset. The results provide some reassurance that these measurement concerns do not have a serious impact on our results. As in our previous estimate, there is still a positive net gain in ROA and Profit Margin between 1995 and 2000, though it is lower (ROA: +1.02 points, Profit margin: +0.02 points). While the net change in ROE was previously insignificant, corrected estimates show that the profitability gap is now worse in the long run, but by only 2.3 points.

7 Concluding Remarks

This paper provides the first comparison of the relationship between workforce reduction and firms' performances in listed and non-listed companies. It gives evidence that the nature of performance deterioration that triggered workforce reduction differs between the two groups of firms. A first group is dealing with *financial distress*, while the second is struggling with a poor *economic position*, close to bankruptcy, and uses workforce reductions as a defensive response to a fall in sales. Moreover, downsizing is a decision taken at different stages in the performance downturn by different firms. The reason may lie in the structure of governance.

[14]We can also argue that given initial characteristics, a downsizing policy may reduce the occurrence of bankruptcy, a positive effect not included in our previous OLS estimates. Future research could address this question, looking at a survival model.

[15]As we are interested in a lower-bound estimate, when data is missing we input the two first percentiles of the observed distribution.

Listed firms, urged by shareholders, downsize before approaching bankruptcy. Defensive layoffs are purported to improve the financial position before it becomes severe. On the contrary, other firms employ layoffs as the last-resort strategy to avoid bankruptcy. This result gives evidence of defensive downsizing, rather than the offensive strategy presented in the management literature. Moreover, in the general set of firms, downsizing is not shareholder-driven. Secondly, if we do not correct for selection bias, our results reach the same conclusion as the management research: a positive effect of downsizing on firms' performances. Thirdly, after correcting for selection bias, our estimates do not support the management thesis. According to the corrected Difference in Differences estimates, for the general set of firms, the productive efficiency (ROA) is increased, but only at a slow rate: +1.8% between 1995- 2000. It is three times smaller than with the simple estimate. The reason derives from a higher increase in the sales per unit of capital among employment downsizers, than among employment upsizers. Finally, the paper provides evidence that for both groups -listed and non-listed companies- downsizing policy does not sustain financial performance (ROE). For non-listed companies, the reason stems from the priority given to the economic ratios over the financial ones. Further research should explain why the listed companies do not improve their financial ratio, although it is a priority in their strategic plan. An important caveat needs to be made about our findings, as we do not control for unobservable variables. While the OLS method analyses the causal impact of exogenous "treatment", we focus on an endogenous decision chosen by the firms themselves (reducing or not reducing the workforce). A possible avenue of future research would be instrumental variable estimation, especially in the case of listed companies where shareholder structure may be a variable that does affect downsizing probability, without directly affecting the future path of performance variables. In the same spirit as

Ahmadjian and Robinson's work (2001) on Japan, further research should also examine the spread of downsizing, focusing on economic and institutional pressures on firms. It would give an institutional dimension to the downsizing policies.

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Table 1: Logistic estimate of the probability to reduce workforce

exogenous variables	dataset A specification 1	dataset A specification 2	dataset B specification 1	dataset B specification 2
Intercept	-0.7327	0.2703	8.9351	2.1892
WORKFORCE STRUCTURE				
Size				
50-199 employees (95)	**0.3918****	**0.3799****	**1.5455***	-
200-499 employees (95)	**0.6178****	**0.5908****	1.2230	-
more than 500 employees (95)	**0.6734****	**0.6355****	1.2519	-
Age				
proportion of 25-35 years old (95) (A2)	-0.0889	-	-0.8171	-
proportion of 35-50 years old (95) (A3)	**0.7635****	**0.8506****	3.0646	-
proportion of more than 50 years old (95) (A4)	**1.7458****	**1.8823****	0.8146	-
Gender				
proportion of female workers (95) (S2)	0.0528	-	0.2378	-
Qualifications				
Share of unskilled workers (95) (Q1)	**-1.4987****	**-1.5572****	-12.5583	-
Share of skilled workers (95) (Q2)	**-1.5655****	**-1.6428****	-13.2582	-
Share of highly skilled workers (95) (Q3)	**-1.4988****	**-1.5273****	-15.3589	**-1.9903****
Share of part-time job (95) (PT)	**0.3464***	**0.2880***	**6.1533***	.
ΔPT (94-95)	-0.2254	-	-1.6820	-
Labour Costs				
Unskilled workers' wage (log) (LCHQ1) (95)	0.0968	-	**2.0075***	**1.7465****
ΔLCHQ1 (94-95)	0.00246	-	-0.5510	-
Skilled workers' wage (log) (LCHQ2) (95)	0.1304	-	0.5034	-
ΔLCHQ2 (94-95)	-0.1122	-	1.5587	-
Highly skilled workers' wage (log) (LCHQ3) (94-95)	0.00728	-	**-1.8310***	**-1.5967****
ΔLCHQ3 (94-95)	**-0.1802***	**-0.2107****	0.3022	-
PAST PERFORMANCES				
Profitability				
Return on Equity (ROE) (95)	**-0.2143****	**-0.4696****	**-4.2160****	**-4.7143****
ΔROE (94-95)	0.1828	-	0.5868	-
Efficiency				
Change in Profit Margin (Pmarg) (94-95)	**-1.3259****	**-1.2583****	-3.6016	-
Change in Labour Productivity (ΔLPROD) (94-95)	**0.2881****	**0.2616****	**1.1916****	**0.6628***
Liquidity ratios				
Interest Cover (ICOVER) (95)	2.3374	**2.9983***	-0.9160	-
ΔICOVER (94-95)	3.6265	-	-0.3440	-
Debt rate (DRATE) (95)	0.0246	-	**0.8829****	**0.6978****
ΔDRATE (94-95)	0.0115	-	-0.4677	-
Long-Term Debt Pressure (LPRES) (95)	0.0553	-	1.2558	-
ΔLPRES (94-95)	0.2590	**0.2771***	-1.9772	-
Sales turnover				
ΔLCA (94-95)	**-0.9748****	**-0.9729****	-0.6064	-
Investment and assets				
Change in Investment Effort (Δ EFFO) (94-95)	0.0293	-	1.4939	-
Change in Assets (Δ Assets) (94-95)	**-0.7641****	**-0.7519****	**-2.6843****	**-1.7709***
ENVIRONMENTAL VARIABLES				
Listed Company (Listed)	0.1337	-	N	N
Group (95)	-0.0667	-	N	N
Competitive Pressure (HI) (95)	**1.1599****	**1.2167****	-0.3258	-
ΔHI (95)	0.00102	-	-0.3091	**-0.3440***
FINANCIAL MARKET VARIABLES				
Change in Capitalization (Δ*Capi*)(94-95)	N	N	0.1569	-
Return on stocks / CAC40	N	N	0.3490	-
Restructuralization (95)	N	N	**-1.2587****	**-0.6365***
Percent Concordant	64.6%	64.4%	81.5%	74%
number of observations	13615	13615	222	222

Sources: BRN, DADS, Euronext. Coefficients with a * are significant with a threshold of 10%; coefficients with a ** are significant with a threshold of 5%. N stands for variables that were not included because they are no longer relevant for the dataset considered. Sectorial variables are included in specification 1 and, whenever they are significant at a 10% threshold, in specification 2. Other explanatory variables included in specification 1 which are not significant are: past change in workforce structure (Dataset A and B: ΔQ1,ΔQ2,ΔQ3), three dummy variables for the market of quotation (Dataset B only: Réglement Mensuel, Marché au comptant, Second Marché).

Table 2: Estimated Impact of Workforce Reduction. Short-term Analysis (1995-1996)

Variables[a]	Dataset A		Dataset B	
SHORT-TERM DIFFERENCES (1995-1996)	**Simple DID**	**Corrected OLS**	**Simple DID**	**Corrected OLS**
PROFITABILITY RATIOS				
Return on assets				
ΔROA	NS	-0,01867**	NS	NS
		(0,00465)		
Return on Equity				
ΔROE	NS	-0,01874**	NS	NS
		(0,00405)		
OPERATING RATIOS				
profit margin				
ΔPMARG	NS	-0,00285**	NS	NS
		(0,00069)		
labour productivity				
ΔLPROD (log)	NS	-0,01047**	NS	NS
		(0,00379)		
labour costs				
ΔLCOST (total) (log)	0,00390**	0,00502**	NS	NS
	(0,00150)	(0,00143)		
ΔLCOST Q1 (log)	NS	NS	NS	NS
ΔLCOST Q2 (log)	NS	0,00292*	NS	NS
		(0,00169)		
ΔLCOST Q3 (log)	NS	NS	0,03759*	NS
			(0,02134)	
LIQUIDITY RATIOS				
Long-term debt pressure				
ΔLPRES	-0,00349*	NS	NS	NS
	(0,00211)			
Debt rate				
ΔDEBT	NS	-0,05789**	NS	NS
		(0,01366)		
INVESTMENT EFFORT				
ΔEFFO	-0,01880**	-0,02784**	NS	NS
	(0,00249)	(0,00194)		
SALES, ASSETS AND EQUITY				
Sales				
ΔLsales	-0,08118**	-0,07974**	-0,26673**	NS
	(0,00309)	(0,00305)	(0,09723)	
Assets				
ΔLassets	-0,04898**	-0,03739**	NS	NS
	(0,00288)	(0,00286)		
EMPLOYMENT				
Workforce level				
ΔLABOUR (log)	-0,19416**	-0,18840**	-0,20499**	-0,16979**
	(0,00273)	(0,00275)	(0,02955)	(0,03052)
Qualifications				
ΔQ1	-0,00482**	-0,00456**	NS	NS
	(0,00123)	(0,00122)		
ΔQ2	0,00227*	NS	NS	NS
	(0,00130)			
ΔQ3	0,00343**	0,00397**	NS	NS
	(0,00091)	(0,00089)		

[a] standard deviation are given in brackets; ** p-value < 0.05; * p-value < 0.10. NS stands for Non-significant at a 10% threshold. Endogenous variables are given in the first column. Each row corresponds to a specific regression, where the economic indicator (say, change in ROE between 1995 and 1996) is explained by the dummy variable T of the employment policy (simple DID estimator) and control variables (corrected OLS estimator). Only the coefficient of the dummy variable T is reported, if significant.

Table 3: Estimated Impact of Workforce Reduction. Medium-term Analysis (1996-1997)

Variables[a]	Dataset A		Dataset B	
MEDIUM-TERM DIFFERENCES (1996-1997)	**Simple DID**	**Corrected OLS**	**Simple DID**	**Corrected OLS**
PROFITABILITY RATIOS				
Return on assets				
ΔROA	0,02639**	0,01906**	0,03736*	NS*
	(0,00458)	(0,00460)	(0,02125)	
Return on Equity				
ΔROE	0,02541**	0,01747**	NS	NS
	(0,00449)	(0,00449)		
OPERATING RATIOS				
profit margin				
ΔPMARG	0,00413**	0,00300**	NS	NS
	(0.00074)	(0.00074)		
labour productivity				
ΔLPROD (log)	0,01267**	0,00918**	0,12117*	0,12374*
	(0.00426)	(0,00433)	(0,07191)	(0,07228)
labour costs				
ΔLCOST (total) (log)	NS	NS	NS	NS
ΔLCOST Q1 (log)	NS	NS	0,04962*	0,05726**
			(0,02523)	(0,02422)
ΔLCOST Q2 (log)	NS	NS	NS	NS
ΔLCOST Q3 (log)	NS	NS	NS	NS
LIQUIDITY RATIOS				
Long-term debt pressure				
ΔLPRES	-0,00808**	-0,00636**	-0,03846*	NS
	(0.00196)	(0,00196)	(0,02106)	
Debt rate				
ΔDEBT	0,04416**	0,03138**	NS	NS
	(0,01372)	(0,01382)		
INVESTMENT EFFORT				
ΔEFFO	0,01646**	0,01394**	NS	NS
	(0,00241)	(0,00242)		
SALES, ASSETS AND EQUITY				
Sales				
ΔLsales (log)	-0,02629**	-0,02255**	NS	NS
	(0,00311)	(0,00315)		
Assets				
ΔLassets (log)	-0,02964**	-0,02112**	-0,04595**	NS
	(0,00306)	(0,00308)	(0,02103)	
EMPLOYMENT				
Workforce level				
ΔLABOUR (log)	NS	0,00692*	NS	NS
		(0,00399)		
Qualifications				
ΔQ1	NS	NS	NS	NS
ΔQ2	NS	NS	NS	NS
ΔQ3	NS	NS	0,02733*	NS
			(0,01096)	

[a] standard deviation are given in brackets; ** p-value < 0.05; * p-value < 0.10 NS stands for Non-significant at a 10% threshold. Endogenous variables are given in the first column. Each row corresponds to a specific regression, where the economic indicator (say, change in ROE between 1996 and 1997) is explained by the dummy variable T of the employment policy (simple DID estimator) and control variables (corrected OLS estimator). Only the coefficient of the dummy variable T is reported, if significant.

Table 4: Estimated Impact of Workforce Reduction. Long-term Analysis (1996-2000)

Variables[a]	Dataset A		Dataset B	
LONG-TERM DIFFERENCES (1996-2000)	**Simple DID**	**Corrected OLS**	**Simple DID**	**Corrected OLS**
PROFITABILITY RATIOS				
Return on assets				
ΔROA	0,05775**	0,03741**	NS	NS
	(0,00690)	(0,00686)		
Return on Equity				
ΔROE	0,02299**	0,01726**	NS	NS
	(0,00795)	(0,00794)		
OPERATING RATIOS				
profit margin				
ΔPMARG	0,00744**	0,00469**	NS	NS
	(0,00109)	(0,00109)		
labour productivity				
ΔLPROD (log)	0,022060**	0,01212**	0,15300*	0,14532*
	(0,00597)	(0,00604)	(0,07654)	(0,07566)
labour costs				
ΔLCOST (total) (log)	-0,00395*	NS	NS	0,09152*
	(0,00229)			(0,04559)
ΔLCOST Q1 (log)	NS	NS	NS	NS
ΔLCOST Q2 (log)	-0,00638**	NS	0,03912*	NS
	(0,00246)		(0,02093)	
ΔLCOST Q3 (log)	NS	NS	NS	NS
LIQUIDITY RATIOS				
Long-term debt pressure				
ΔLPRES	NS	NS	-0,08874**	NS
			(0,04288)	
Debt rate				
ΔDEBT	NS	NS	NS	NS
INVESTMENT EFFORT				
ΔEFFO	0,02724**	0,02160**	NS	NS
	(0,00267)	(0,00270)		
SALES, ASSETS AND EQUITY				
Sales				
ΔLsales (log)	-0,04555**	-0,03062**	NS	NS
	(0,00620)	(0,00620)		
Assets				
ΔLassets (log)	-0,08575**	-0,05264**	-0,12236*	NS
	(0,00675)	(0,00666)	(0,07064)	
EMPLOYMENT				
Workforce level				
ΔLABOUR (log)	-0,02982**	NS	-0,16410*	NS
	(0,00940)		(0,09087)	
Qualifications				
ΔQ1	NS	NS	NS	-0,02933
				(0,01611)
ΔQ2	NS	-0,00494**	NS	NS
		(0,00236)		
ΔQ3	NS	NS	0,05050**	0,05396**
			(0,02248)	(0,02187)

[a] standard deviation are given in brackets; ** p-value < 0.05; * p-value < 0.10. NS stands for Non-significant at a 10% threshold. Endogenous variables are given in the first column. Each row corresponds to a specific regression, where the economic indicator (say, change in ROE between 1996 and 2000) is explained by the dummy variable T of the employment policy (simple DID estimator) and control variables (corrected OLS estimator). Only the coefficient of the dummy variable T is reported, if significant.

Table 5: Logistic Estimate of the Probability of Missing Companies

exogenous variables	Prob of being missing in 1997	Prob of being missing in 2000
Intercept	0.1685	**1.1449****
WORKFORCE STRUCTURE		
Size		
50-199 employees (95)	**0.2162****	**0.1119****
200-499 employees (95)	**0.4493****	-
Age		
proportion of 25-35 years old (95) (A2)	**2.2779****	**1.3278****
proportion of 35-50 years old (95) (A3)	**2.9864****	**1.4266****
proportion of more than 50 years old (95) (A4)	**2.5158****	**1.3711****
qualifications		
Share of skilled workers (95) (Q2)	**0.9122****	**0.3321****
Share of highly skilled workers (95) (Q3)	**1.3856****	**0.5826****
Share of part-time job (95) (PT)	**0.9644****	**0.5341****
LABOUR COSTS		
Change in hourly rate of unskilled workers (log) (ΔLCHQ1) (94-95)	-	**0.1429***
Change in hourly rate of skilled workers (log) (ΔLCHQ2) (94-95)	**0.5998****	-
Hourly rate of highly skilled workers (log) (LCHQ3) (95)	**-0.8841****	**-0.7043****
Change in hourly rate of highly skilled workers (log) (ΔLCHQ3) (94-95)	**-0.6300****	-
PAST PERFORMANCES		
Profitability		
Return on Equity (ROE) (95)	**-0.7500****	**-0.4858****
Operating ratios		
Change in Profit Margin (ΔPmargin) (94-95)	**-2.3798****	**-1.7061****
Liquidity ratios		
Interest Cover (ICOVER) (95)	**11.7653****	**10.3533****
Debt Rate (95)	**0.1883****	**0.1283****
Long-Term Debt Pressure (LPRES) (95)	**-0.5608****	**-0.4716****
Change in Long-Term Debt Pressure (ΔLPRES) (94-95)	**0.7754****	**0.6840****
Investment and assets		
Investment effort (EFFO) (95)	**-0.4580****	**-0.2650****
Change in assets (ΔASSETS) (LOG) (94-95)	**-0.4737****	**-0.2938****
ENVIRONMENTAL VARIABLES		
Listed on a Stock Market (LISTED) (95)	N	**-1.6246****
Group (95)	**0.3158****	**0.4514****
Percent concordant	83.9%	70.2%

Sources: BRN, DADS, Euronext. Endogenous variable: being missing in the year of reference (Y=1) or not (Y=0). Coefficients with a * are significant with a threshold of 10%; coefficients with a ** are significant with a threshold of 5%. N stands for variables that were not included because they are no longer relevant for the dataset considered. Sectorial variables are included in both estimations.