Workforce Reduction and Firm Performance: a Comparison between French Publicly-Listed and Non-Listed Companies 1994-2000

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Abstract

Using an exhaustive database with labour, accounting and financial market information on French firms between 1994 and 2000, we analyse the causes and consequences of workforce reduction, and compare the results for publicly-listed and non-listed companies. A logistic estimate shows that headcount reduction occurs in less-productive and financially distressed firms, using downsizing as a defensive response to an adverse economic shock. Once we take into account initial characteristics of firms, we find that the major performance indicators are significantly improved only for non-listed companies, but that overall there is no net gain on the full period of study.

JEL classification: C14, D21, G14, J63, L25

Keywords: Workforce reduction, downsizing, layoffs, financial performance, selection bias.

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Appendix

employment		Breakdown			
variation in 1996		general set of firms (A)	set of listed companies (B)		
strong reduction	$\Delta < -5\%$	22.60%	23.93%		
weak reduction	$-5\% \leqslant \Delta < 0\%$	20.56%	30.06%		
weak increase	$0\% \leqslant \Delta \leqslant 5\%$	21.70%	25.15%		
strong increase	$\Delta > 5\%$	35.14%	20.86%		

Table 1: Breakdown according to Annual Employment Variation

Figure 1: Reducing the workforce or the working time?



Sources: BRN, DADS. The average number of hours per worker is computed as the total number of hours worked over the number of employees. The diagrams show the distribution of firms according to the percentage change in average number of hours worked between the end of 1995 and the end of 1996. For the two datasets, we look at two separate groups, those who increased (T=0, first row) versus those who increased (T=1, second row) their workforce. The two thresholds of -15% and -10% implied by the Robien Law are shown by the vertical doted lines

exogenous variables	dataset A	dataset A	dataset B	dataset B
exogenous vurnores	specification 1	specification 2	specification 1	specification 2
	specification 1	specification 2	specification 1	specification 2
Intercent	-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 (Δ LPROD) (94-95)	0.2881**	0.2616**	1.1916**	0.6628*
Liquidity ratios				
Interest Cover (ICOVER) (95)	2.3374	2.9983*	-0.9160	-
Δ ICOVER (94-95)	3.6265	-	-0.3440	-
Debt rate (DRATE) (95)	0.0246	-	0.8829**	0.6978**
ADRATE (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*
g				
ENVIRONMENTAL VARIABLES				
Listed Company (Listed)	0 1337	-	Ν	Ν
Group (95)	-0.0667	-	N	N
Competitive Pressure (HI) (95)	1.1599**	1.2167**	-0.3258	-
AHI (95)	0.00102	-	-0.3091	-0.3440*
<- /	0.00102		0.0071	
FINANCIAL MARKET VARIABLES				
Change in Capitalization $(\Lambda Cani)(94-95)$	Ν	Ν	0.1569	-
Return on stocks / CAC40	N	N	0.3490	_
Restructuralization (95)	N	N	-1.2587**	-0.6365*
		- ·		010000
Percent Concordant	64.6%	64.4%	81.5%	74%
number of observations	13615	13615	222	222

Table 2: Logistic estimate of the probability to reduce workforce

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: $\Delta Q1, \Delta Q2, \Delta Q3$), three dummy variables for the market of quotation (Dataset B only: Réglement Mensuel, Marché au comptant, Second Marché).

Variables ^a	Dataset A		Dataset B	
SHOPT-TEDM				
DIFFERENCES				
(1995-1996)	Simple DID	Corrected OLS	Simple DID	Corrected OLS
PROFITABILITY RATIOS				
Return on assets				
ΔROA	NS	-0,01867**	NS	NS
Return on Fauity		(0,00+05)		
ΔROE	NS	-0,01874** (0,00405)	NS	NS
OPERATING RATIOS		(0,000,000)		
profit margin				
ΔPMARG	NS	-0,00285** (0,00069)	NS	NS
labour productivity				
ΔLPROD (log)	NS	-0,01047** (0,00379)	NS	NS
labour costs				
$\Delta LCOST$ (total) (log)	0,00390** (0,00150)	0,00502** (0,00143)	NS	NS
ΔLCOST Q1 (log)	NS	NS	NS	NS
ΔLCOST Q2 (log)	NS	0,00292* (0,00169)	NS	NS
ΔLCOST Q3 (log)	NS	NS	0,03759* (0,02134)	NS
LIQUIDITY RATIOS				
ΔLPRES	-0,00349* (0,00211)	NS	NS	NS
Debt rate	(0,002)			
ΔDEBT	NS	-0,05789** (0,01366)	NS	NS
INVESTMENT EFFORT				
ΔEFFO	-0,01880** (0,00249)	-0,02784** (0,00194)	NS	NS
SALES, ASSETS AND EQUITY				
ΔLsales	-0.08118**	-0.07974**	-0.26673**	NS
	(0,00309)	(0,00305)	(0,09723)	110
Assets	0.010-01	0.0000000		**
ΔLassets	-0,04898** (0,00288)	-0,03739** (0,00286)	NS	NS
EMPLOYMENT Westformed				
WORKJORCE LEVEL	0 10 41 6 **	0 10040**	0 20400**	0.1/070**
ALABOUR (log)	(0,00273)	(0,00275)	(0,02955)	(0,03052)
Qualifications	0.00.1001	0.0015		
ΔQI	-0,00482** (0,00123)	-0,00456** (0,00122)	NS	NS
٨02	0.00227*	NC	NC	NS
<u>492</u>	(0,00130)	C M L	CA1	CM1
$\Delta Q3$	0,00343** (0,00091)	0,00397** (0,00089)	NS	NS

Table 3: Estimated Impact of Workforce Reduction. Short-term Analysis (1995-1996)

^{*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.

Variables ^a	Dataset A		Dataset B		
Medium-term					
DIFFERENCES					
(1996-1997)	Simple DID	Corrected OLS	Simple DID	Corrected OLS	
DECEMBER OF THE PARTICULAR					
PROFITABILITY RATIOS					
AROA	0.02639**	0.01906**	0.03736*	NS*	
	(0.00458)	(0.00460)	(0.02125)	115	
Return on Equity	(0,00,00)	(0,00000)	(0,02222)		
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	0.010(7**	0.00010**	0 10117*	0.1007.4*	
$\Delta LPROD$ (log)	0,01267**	0,00918**	0,12117*	0,12374*	
labour costs	(0.00426)	(0,00433)	(0,07191)	(0,07228)	
ALCOST (total) (log)	NC	NS	NC	NC	
ALCOST (total) (tog)	C/I	145	115	115	
	NO	NC	0.040/2*	0.0570.4**	
ALCOST QI (log)	NS	NS	0,04962*	0,05726**	
			(0,02523)	(0,02422)	
ALCOST O2 (log)	NS	NS	NS	NS	
	115	115	115	115	
$\Delta I COST O2 (log)$	NS	NC	NS	NS	
2LCOST Q3 (log)	C/I	143	143	105	
LIQUIDITY RATIOS					
AI DDES	0.00808**	0.00636**	0.03846*	NS	
ALF KES	-0,00808	-0,00030**	-0,03840	C M	
Deht rate	(0.00190)	(0,00190)	(0,02100)		
ADEBT	0.04416**	0.03138**	NS	NS	
	(0.01372)	(0.01382)	145	145	
	(0,01572)	(0,01502)			
INVESTMENT EFFORT					
ΔEFFO	0,01646**	0,01394**	NS	NS	
	(0,00241)	(0,00242)			
SALES, ASSETS AND EQUITY					
Sales					
Δ Lsales (log)	-0,02629**	-0,02255**	NS	NS	
	(0,00311)	(0,00315)			
Assets	0.000 4 444	0.00110	0.0450555		
Δ Lassets (log)	-0,02964**	-0,02112**	-0,04595**	NS	
EMDI OVMENT	(0,00306)	(0,00308)	(0,02103)		
<u>EmrLUIMENI</u> Workforeg lavel					
AL A BOUR (log)	NS	0.00602*	NS	NS	
ALADOUR (10g)	113	(0.00399)	110	CM1	
Oualifications		(0,00577)			
ΔΟ1	NS	NS	NS	NS	
	1.0	1.5	1.0		
402	NC	NC	NC	NC	
1 <u>7</u> 2	CN1	CN1	Cut Cut	CAL	
402	NT (1	NC	0.00722**	NC	
ΔQ3	NS	NS	0,02733*	NS	

Table 4: Estimated Impact of Workforce Reduction. Medium-term Analysis (1996-1997)

(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 5:	Estimated Im	pact of Work	force Reduction	n. Long-term	Analysis	(1996-2000)
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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				
Δ LPROD (log)	0,022060**	0,01212**	0,15300*	0,14532*
	(0,00597)	(0,00604)	(0,07654)	(0,07566)
	0.00205*	NG	NO	0.00153*
$\Delta LCOST (total) (log)$	-0,00395*	NS	NS	0,09152*
	(0,00229)			(0,04559)
ΔLCOST Q1 (log)	NS	NS	NS	NS
ΔLCOST Q2 (log)	-0,00638** (0,00246)	NS	0,03912* (0,02093)	NS
ΔLCOST Q3 (log)	NS	NS	NS	NS
LIQUIDITY RATIOS Long-term debt pressure ALPRES	NS	NS	-0,08874** (0,04288)	NS
Debt rate				
ADEBT	NS	NS	NS	NS
INVESTMENT EFFORT				
ΔEFFO	0,02724** (0,00267)	0,02160** (0,00270)	NS	NS
SALES, ASSETS AND EQUITY				
AL sales (log)	-0.04555**	-0.03062**	NS	NS
	(0,00620)	(0,00620)	115	115
Assets				
Δ Lassets (log)	-0,08575**	-0,05264**	-0,12236*	NS
-	(0,00675)	(0,00666)	(0,07064)	
EMPLOYMENT				
Workforce level	0.00002**	NC	0.16410*	NC
$\Delta LABOUR$ (log)	-0,02982*** (0,00940)	INS	-0,16410* (0,09087)	INS
Qualifications				
$\Delta Q1$	NS	NS	NS	-0,02933 (0,01611)
ΔQ2	NS	-0,00494** (0,00236)	NS	NS
$\Delta Q3$	NS	NS	0,05050** (0,02248)	0,05396** (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.

evogenous variables	Proh of heing missing	Proh of heing missing
chogenous variables	in 1997	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) (Δ LCHQ1) (94-95)	-	0.1429*
Change in hourly rate of skilled workers (log) (Δ LCHQ2) (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) (Δ LCHQ3) (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 (Δ LPRES) (94-95)	0.7754**	0.6840**
Investment and assets		
Investment effort (EFFO) (95)	-0.4580**	-0.2650**
Change in assets (Δ ASSETS) (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%
i ci cent concor adiit	00.770	10.270

Table 6: Logistic Estimate of the Probability of Missing Companies

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.

Introduction

In the late 1980s, massive layoffs became a pervasive phenomenon throughout the American business world. Urged by financial markets to increase their return on equity, even though they already enjoyed strong profits, large corporations embraced internal workouts, which consisted of large workforce reductions. This practice quickly became one of the world's leading management fads. On the one hand, the management literature found that, on average, financial performance seems to be improved following layoff decisions (see Womack et al. (1991), Cascio (1993), Wayhan & Werner (2000)). On the other hand, economic research on this subject is still babbling, and its conflicting evidence on the financial consequences of downsizing may be explained by important statistical shortcomings. Firstly, samples used are somewhat limited in their size. Secondly, no distinction is made between publicly-listed and non-listed companies although the causes of downsizing and - as a consequence - their economic performance seem to be different. Thirdly, in order to analyse the impact of downsizing on firm performance, previous studies usually compare the average profitability growth, depending whether companies have or not reduced their workforce. In this sense, they implicitly assume that the consequences of a workforce reduction are not contingent upon the initial characteristics of firms in which they were initiated. We address these concerns by building an exhaustive longitudinal database (1994 - 2000) on French firms with accounting, labour

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and financial market information, for both listed and non-listed companies.

This paper is organized in six sections. Section I surveys the management and economic literature on downsizing. Section II describes how the database is built from three different data sets. Section III presents the econometric strategy, grounded on the need to control for a selection bias between employment upsizers and downsizers. Section IV explores the determinants of the decision to reduce the workforce in 1996, the reference year chosen for this study. In section V, we estimate the impact of workforce reduction using a corrected Difference in Differences estimator. The economic effects are analysed by investigating the short and long term performance of firms that downsize in comparison with other firms having similar initial characteristics. Section VI concludes.

1 "Downsizing: Still Something to Learn?"

On the conceptual side, organizational downsizing lacks a precise theoretical formulation. The management press compares downsizing to positive terms such as "brightsizing", "leaning up" and "miracle cure" (Downs, 1995). On the opposite, sociological studies convey the message of cynicism, such as "dumbsizing" and "corporate anorexia". The economic literature focuses on two existing forms of downsizing. An offensive downsizing is clearly defined in three steps by Cameron, Freeman and Mishra (1993), as (1) an intentional plan whose (2) mean is a reduction of a company's size, that is to say either it's workforce or it's assets and whose (3) purpose is mainly an increase in it's profitability. So offensive downsizing appears as a well-prepared strategy from the managers. Cascio (1993) asserts that downsizing is essentially a purposive strategy defined as "the planned eliminations of positions or jobs" while Cameron

(1994) stresses these positive impacts of downsizing on efficiency and productivity. On the contrary, a defensive downsizing constitutes a reactive firms response to avoid bankruptcy.

On the empirical side, a first set of studies examines the main predictors of downsizing. Budros (1999) presents a general framework with both sociological and economic causes of downsizing. Economic causes are classified in two categories: internal inefficiency (oversized firms) or external pressures (shareholder values, deregulation). However, few studies try to measure explicitly the importance of these factors. The González and Vicente-Lorente'study (2000) concludes that for the period 1989-1994, downsizing in Spain occurred among the largest firms, with low productivity levels, financial difficulties, and decreasing scale of activity. However, this evidence is not conclusive since their sample only includes 297 firms. 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 companies is so small that their results are hardly significant. Cascio, Young and Morris (1997) find 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 tend to suggest a positive outcome of restructuring. Using a sample of 90 large companies whose workforce has been reduced by more than 10 percent, Sentis (1998) shows that indebtness decreases after a large workforce reduction. D'arcimoles and FakhFakh (1997) claim that layoffs are profitable when they affect not only the worforce level, but also it's structure. However, the accounting standards used in these previous studies, 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.

2 The Data: Accounting, Labour and Financial Variables

The data we use originates from three data sets, thanks to which we get labour, economic and financial information on French companies over the period 1994-2000. Note that these data sets are exhaustive, and are supposed 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 companies¹ that were quoted 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 along the period of study. Finally, the Euronext dataset track the traded securities of listed companies, each stock being registered under a unique ID code, called Sicovam. We identify for each traded security 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 $$-^{1}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.$

over the year². We thus avoid the important accounting bias induced by a measure of labour exclusively based on the end of the fiscal year. We select firms whose workforce in 1995 is over 20 employees. Doing so, we eliminate small companies for which the purpose of this study may be irrelevant. After filtering for influential data³ and eliminating specific sectors⁴, 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. 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 financial key 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: employment downsizers and employment upsizers. Our variable includes both full-time and part-time jobs. However, firms could reclassify fulltime 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 for employment upsizers is actually decreased from 7.18% to 6.55%, and from 7.31% to 6.48% for employer downsizers. A Tukey's Studentized Range Test indicates that the difference

²Arithmetical 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.

³We exclude observations corresponding to the first and last percentiles of economic and financial ratios.

⁴Companies 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.

between the two groups is not statistically different at a 5% threshold. More generally, firms are allowed to reduce the working time instead of cutting the workforce down. In such a case, our measure would be biased. In figure 1, 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 jointly used. We then assess the potential impact on our employment measure of the Robien Law (June 11th 1996), a legislative framework that was an incentive to reduce working time in order to create or save jobs. However, only one hundred and eight firms chose the Robien's framework between it's start in July and the end of December 1996⁵. Among them, only one firm was publicly-listed and included in database B.

We organize *accounting data* in four major categories, where we keep the most relevant indicators. Some of them differ from the traditional accounting ratios, in which both the numerator and denominator may change their sign and become negative, making the analysis difficult when one looks at the change in these ratios.

- The Profitability Ratios tell us whether a business is making profits and if so whether 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 = $\frac{\text{Net Profit before tax, interest and dividend (EBIT)}}{\text{Sales}}$

⁵Source: Ministry of Labour, dataset on Robien Law agreements.

- Labour Productivity: Lprod = $\frac{\text{Value added}}{\text{Total hours worked}}$
- Labour Cost: $Lcost = \frac{Wages + social contributions}{Total hours worked}$
- The Liquidity Ratios indicate how capable a business is of meeting its short-term obligations as they fall due.
 - Debt rate: Debt $= \frac{\text{Long-term debt}}{\text{Equity} + \text{long-term debt}}$
 - Long-term debt pressure: Lpres = $\frac{\text{Long-term debt}}{\text{Total debt}}$
 - Interest Cover: $Icov = \frac{Interests}{Sales}$
- Investment effort: $Effo = \frac{\text{Investments}}{\text{Fixed assets}}$

Furthermore, we include *financial market information* for publicly-listed companies, such as the change in stock price and the change in capitalization (computed in consecutive years). Stock prices have been adjusted, taking into account the change in the total number of shares⁶. We also use *labour information* regarding workforce, namely gender, qualification (divided into four categories from the less qualified q0 to the most qualified q3), age (four categories a1-a4) and the weight of part-time work in total workforce.

Depending on their change in workforce in 1996, companies are then divided into employment downsizers and employment upsizers. The median number of workers in firms who reduced employment in 1995-96 declines from 37 to 33 (a change of 10%) in dataset A, while quoted companies of dataset B show a larger decrease from 380 to 260 workers (a change of 25%). The workforce then remains roughly at the 1996 level, showing that the decrease in organizational size is permanent. Following the work of Cascio, Young and Morris (1997), we

⁶Adjustment coefficients were provided by Euronext.

look at the sign and strength of workforce change in 1996 (table 1). We classify companies between downsizers, upsizers or stable employers with a cutoff point of $\pm 5\%$ in employment change, generating a balanced breakdown. A large share of employers (nearly 22%) are strong employement downsizers, which indicates that we are looking at important changes in workforce, and not a marginal one. Though listed companies are more inclined to shed jobs, they are not more likely to be strong employment downsizers than companies in set A.

3 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 program has been adopted in 1995-96, 0 otherwise), and the subscripts *i* and *t* identify respectively the firm and the time period. Let also *T* be a dummy variable with value $T_i = 1$ when the firm belong 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 summarized by the fact that we can estimate $E(Y_{i1}|T_i = 1)$, but not $E(Y_{i0}|T_i = 1)$. A natural way to cope with this problem is to use a Difference In 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 this estimator is potentially biased when it does not include the characteristic of firms that influence 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 an individualspecific fixed 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 programme. 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 the treated.

Our main contribution is first to consider observable variables that affect employment policy, 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

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

Then using the distribution of covariates X, an unbiased estimator of $\tau|_{T=1}^{true}$ is given by

 $\tau|_{T=1}^{corrected} = E_{X_i} \left\{ \begin{array}{c} \tau_i|_{X_i,T_i=1}^{corrected} \end{array} \right\}$

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 characterise 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^7 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 the gross change and the dip. Note that these estimates give the impact of employment policy on the *qap* between downsizing firms and other firms for each variable of interest, rather than on the *level* of these variables.

⁷We 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).

Our econometric strategy requires that labour, accounting and financial-market information is available both before and after the year when headcount reduction occurs⁸. As a consequence, 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.

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

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

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

First, it appears that the probability for a firm to be involved in a workforce reduction in 1996 increases with some structural parameters which are : 1/ the size of the firms (more than 500 employees in 1995: 0.6355); 2/ The proportion of old 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 precarious jobs. 4/ The high level of the Herfindal index ($hi_{-}95$: 1.2167). Firms who 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 workforce is higher in companies char-

⁸We discuss in section 5 the problem raised by missing data and bankrupted firms and how this may affect our estimates.

acterised by a low level of Return on Equity (ROE:-0.4696), an increase of long term debt pressure (*Lpress*: 0.2771) and of insolvency (*interest cover*: 2.9983). Notice that this insolvency increases despite the leverage effect implied by a reduction of firms assets ($\Delta Assets_{95}$: -0.7519) in 1994-1995.

Thirdly, the cost of labour of unskilled workers 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.

Note that due to the gloomy economic outlook, firms reduce employment in spite of a fostered productivity ($d1_lpht = 0.2616$). The rise in labour productivity is a necessary step before reducing workforce without a disorganization 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 wage of the 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 to reduce the employment, which contradicts the hypothesis of shareholder-driven downsizing. However, this issue has to be raised in a separate logit estimation on publicly-listed firms.

4.2 Reducing Workforce as a Way to Improve Financial Stance for Listed Companies

We turn now to estimate the probability for a publicly-listed firm to be involved in a workforce reduction. The columns 3 and 4 in Table 2 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 publiclylisted companies belong to a group. Secondly, we include stock market-based variables: the change in capitalization, a dummy variable indicating whether the firm's stock outperformed the CAC40 index⁹, 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 of shares and their price. Workforce reductions in 1996, primarily, are more likely to occur in firms whose competitive-ness 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 earnings before interest and taxes are too low to be shared among the managers are more inclined to shed jobs.

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 skilled structure. For example, a low proportion of skilled workers $(q3_95:-1.9903)$ at low cost $(lchq3_95:-1.5967)$ increases the probability to layoff.

⁹This index is made up of 40 shares, selected from the one hundred biggest companies listed on Euronext Paris, measured in terms of market capitalization. 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 $1(\Delta$ Share Price > Δ CAC40)

Finally, the workforce reduction appears to be a strategic response to a poor strictly financial stance and not an economic one. As opposed to the general set of firms, publicly-listed companies are not close to bankruptcy. In 1995, they are facing a high level of the debt-pressure and a low ROE (respectively *cper_tendt95*: 0.6978, ROE_95 : -4.7143). Notice that the leverage effect plays no favourable role in the ROE's level. Moreover, these firms deal with a high level of debt through a decrease of their assets in 1994-1995 ($d1_assets_95$: 1.7709). This workforce reduction, driven by financial factors, occurs through an increased labour productivity in 1994-1995 ($d1_lpht_95$: 0.6628).

5 Estimating the Impact of Workforce Reduction

In tables 3, 4 and 5, 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 the control variables for the corrected estimator.

For the general set of companies, headcount 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 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 stance 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 headcount reduction are long-lasting: investment efforts are increasing (+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 an 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 is ROE and Profit Margin vanishes, meaning that firms that make large layoffs are no longer those that will have a 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 a defensive downsizing, and calls for further investigation on the change in assets and sales. First, both the simple and corrected estimators indicate that the gap in assets increases in the long run, showing that downsizing firms follow a different pattern of asset capitalization. One may have in mind a so-called "asset-lite" strategy, which calls for the company to slow down its investments. Secondly, the gap in assets is widened 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 increase in ROA in the long-run.

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 that the simple and OLS estimators exhibit, continues it's ascending trend in 1997 and 2000 (respectively: +12.37% and +14,53%, OLS estimators), while labour costs are growing more slowly (+9.14 in 1996-2000). This gap suggests that some profitability gains exist but are not yet transformed into an increase of the ROE. Finally, the changes in the structure of the qualifications suggest that firms are always involved in a restructuring process which does not allow to conclude to significant and positive results, possibly because of a high variance in the results of our sample.

The results that refer to listed companies can be compared to the ones found in Wayhan and Werner (2000) on a set of the largest 250 U.S. corporations. Basing their estimates on the change in capitalization 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 characreised 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 the 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: among 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. First, we test the logical relationship between disappearing from dataset A, and the initial characteristics of companies (Table 6). As expected, a higher probability of being missing is linked with mediocre 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. Notice that firms belonging to a group are more likely to disappear from the dataset. This might indicate that firms have merged with some other entities within the group. In this case one cannot easily assess the bias that might be generated on our previous estimates as these firms could be either in 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 more likely to face bankruptcy according to our data, our previous OLS estimates based on surviving firm may be upward biased¹⁰. 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 datapoints that were previously missing. That is, each year datapoints are missing we input values that firms would have been likely to exhibit, should they have survived¹¹. OLS estimates are then run on the corrected dataset. The results provide some reinsurance 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 worsened in the long run, but by only 2.3 points.

6 Conclusion

¹⁰We can also argue that given initial characteristics, a downsizing policy may reduce the occurence of bankruptcy, a positive effect not included in our previous OLS estimates. Future research could address this question, looking at a survival model.

¹¹As we are interested in a lower-bound estimate, when data is missing we input the two first percentiles of the observed distribution.

This paper provides the first comparison of the relationship between workforce reduction and firms performance in listed and non-listed companies. It gives evidence that the nature of performance deterioration that triggered workforce reduction differs between the two group of firms. The former deals with a *financial distress*, while the latter struggles with a poor *economic stance*, close to bankruptcy, and use headcount reductions as a defensive response to a fall in sales. Moreover, the downsizing decison is made at different stage of firms' performance downturn. The reason may lie on the structure of governance. Listed firms, urged by shareholders, downsize before being close to bankrupcy. Defensive layoffs are purported to improve the financial stance before it becomes severe. On the contrary, other firms employ layoffs as the last strategy to avoid bankruptcy. This result gives evidence of a defensive downsizing,

rather than the offensive strategy presented the management literature. Moreover, in the general set of firms downsizing is not shareholder driven. Secondly, if we do not correct for selection biais, our results reach to the same conclusion as the management researchs: that is a positive effect of downsizing upon firms performance. 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 at a slow rate: +1.8% between 1995- 2000. It is three times smaller than with the simple estimate. The reason comes from a higher increase in the sales per unit of capital among employment downsizers, than among employment upsizers. Finally, the paper provides evidence for both groups, listed and non-listed companies, that downsizing policy does not foster financial performance (ROE). For non-listed companies, the reason lies on 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 of 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 the shareholder structure may be a variable that does affect downsizing probability, without directly affecting the future path of performance variables.

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