

The dynamics of job destruction, workforce characteristics and economic performance:
Evidence from firm-level data in France, 2007-2018 *

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Abstract

We study the determinants of job destruction among companies with 50-plus employees. We use French firm-level data from 2007 to 2018 and propose two approaches. The first is the identification, with an original algorithm, of the number of firms resorting to mass layoffs, legally defined as being in a position to have to implement a *Plan de Sauvegarde de l'Emploi* (PSE). We find that firm workforce composition (age and occupation) influences the probability of a firm adopting a PSE. Then, we find strong evidence that lower economic and financial performance is associated with a greater likelihood of implementing a PSE. The second approach consists of quantile regression analyses of the annual variation in jobs. Differences in job growth are mostly attributable to sociodemographic variables and to indebtedness. Overall, we find consistent but not identical results on job destruction and on the probability of being in a position of adopting a PSE.

Keywords: Labor Markets, Layoffs, Firms growth, Accounting indicators

JEL Classification: D22, J23, J63

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1 Introduction

Contrary to the conventional wisdom that associates mass layoffs exclusively with impending recessions and economic downturns, recent events have underscored the occurrence of significant workforce displacements even in sectors known for their stability and solid performance. During the first half of 2023, the US technology sector witnessed an unprecedented disruption, displacing a staggering 200,000 workers. Acknowledging the enduring adverse effects on workers (Jacobson et al., 1993; Couch and Placzek, 2010; Davis and Von Wachter, 2011; Brandily et al., 2020; Bertheau et al., 2022), and the consequential ripple effects experienced by local labor markets (Gathmann et al., 2020), governments around the globe have created policies aimed to mitigate such effects. While research has focused on the consequences of mass layoffs on workers, our current understanding of the specific factors that trigger these events remains incomplete. This study seeks to address this gap by examining the influence of firm financials and workforce composition on the occurrence of mass layoffs. By shedding light on the triggers of mass layoff and job growth determinants, we aim to contribute to their identification and mitigation.

In this paper, we present a comprehensive analysis of the determinants of downsizing by examining the financial situation and workforce structure of 50-plus-employee firms in France, from 2007 to 2018. Our definition of downsizing is in line with the regulatory framework established by French legislation and is coherent with the dynamics of the country's industrial and labor landscape. To gauge the financial position of firms, we employ financial statement data encompassing various performance indicators, such as productivity, indebtedness, investment levels, ownership, and concentration. Additionally, we incorporate workforce composition variables that capture the firm's demographic composition relative to the broader labor market, encompassing factors such as age, gender, and job type. In the latter part of our investigation, we explore whether the drivers of firm downsizing mirror those of expansion while also elucidating the growth patterns of firms based on the aforementioned characteristics.

How does one effectively measure job destruction? What factors contribute to an increased likelihood of job destruction? The voluntary nature of displacements suggests that workers perceive greater utility in moving rather than staying, potentially driven by higher monetary incentives. On the other hand, involuntary displacements indicate that firms may find themselves better off without certain workers, as such separations initiated by the firm often signify the removal of unprofitable matches or workers misaligned with desired organizational structures. While existing literature has frequently relied on mass layoffs as a proxy for involuntary separations, commonly associated with downsizing and internal reorganization within firms, this paper takes a distinct approach. By leveraging detailed

separation information from administrative registries, merged with employer-employee datasets and financial records of firms, our methodology aligns with the precise legislative framework in France, allowing for accurate identification and classification of mass layoffs.

The contributions of the paper are as follows. First, we contribute to the literature on job displacement that focuses on mass layoffs by tracking a French legal procedure that firms with 50 employees or more must follow in the case of collective dismissals: the ‘job protection plan’ (*plan de sauvegarde de l’emploi*, henceforth PSE). Following the law, a firm must put a PSE in place in the case of dismissing ten or more employees for economic reasons over thirty days. This article is the first attempt to systematically track firms that meet the legal conditions of mass layoffs.

Second, we contribute to the literature on corporate change, which often provides analyses with equivocal results because of small samples, and different definitions of downsizing. To avoid the use of any *ad hoc* thresholds to define mass layoffs, we compute the annual growth rate of job positions at the firm level and estimate quantile regressions to assess the differentiated effects of firm characteristics on that rate according to whether the firms destroy or create jobs. More specifically, we explore the impact of two sets of variables. We focus on workforce composition in terms of gender, age, and occupation. We calculate the share of job positions in the firm for each modality of these variables. Then, each share is compared to the median share to capture cross-firm differences in workforce composition. We also investigate the effect of the firm’s past economic performances - in terms of profitability, productivity, investment, indebtedness, and liquidity on job destruction.

Third, we contribute to the literature on employment growth by analyzing the entire universe of French firms. We study the distribution of the yearly change in firms’ employment and present evidence of the heterogeneous effect of firm characteristics on employment expansion and contraction.

Firm size and indebtedness stand out as contributing factors of massive job destruction, whereas an over-representation of young workers, investment efforts, and decreases in the turnover on sales are preventing factors. Oddly enough, the other accounting indicators, especially the return on assets and socio-demographic variables, namely gender and occupational variables, have unexpected effects on massive job destruction. This surprising result indicates that PSE and massive layoffs do not follow the same logic. Robustness tests include the consideration of alternative lags, the expression of the variables as three-year averages, or using alternative measures of profitability, indebtedness, and liquidity.

Related Literature The literature on the effects of layoffs on workers' outcomes is extensive. Studies have documented the main characteristics of displaced workers (Kletzer, 1998), as well as the consequences of job displacement on earnings (Jacobson et al., 1993; Flaaen et al., 2019), employment, and wages (Bertheau et al., 2022). More recent articles have focused on firm outcomes, such as productivity and the labor share at the firm level (Brandily et al., 2020).

However, one of the open questions is to determine the characteristics that influence firms to have mass layoffs. Moreira (2016) finds that firms' life cycle is linked to the economic cycle. While the negative effect of the economic cycle is known to be a cause of firm exit and downsizing (Moscarini and Postel-Vinay, 2012; Davis and Haltiwanger, 1999), less is known about the individual firm characteristics and financial performance indicators that determine downsizing.

The literature on the risk of displacement is scarce, but it can be divided into two perspectives: the individual worker and the firm.

At the individual level, studies have examined the likelihood of a worker being displaced and its effects on wages (Carneiro and Portugal, 2008). Other studies have found that the characteristics of the worker and the job they hold also play a role in the decision of displacement (Seim, 2019). The likelihood of displacement also changes depending on the difference between the firm's requirements and the worker's endowments (Margolis and Montana, 2023). Also the type of job contract, i.e. permanent contracts (*contrat à durée indéterminée*, CDI) versus temporary contracts (*contrat à durée déterminée*, CDD), plays a significant role in determining worker separation. Comparing economic and personal dismissals, Signoretto and Valentin (2019) confirm that the legal distinction in French labor regulation corresponds to different situations: degraded economic conditions tend to trigger economic dismissals, whereas human resource policies (especially reactions to misconduct or lower-than-expected individual performances) drive personal dismissals.

At the firm level, both the composition and performance of the firm seem to play an important role in the incidence of displacement (Abowd et al., 2009; Fackler et al., 2013). Firm survival is also sensitive to the skill composition of the firm (Geroski et al., 2010). This paper contributes to the literature by disaggregating the possible causes of displacement events. In particular, we focus on the role of firm characteristics while focusing on financial performance and human capital variables. The occupational structure at the firm level is also relevant when analyzing firms' size and its changes. Harrigan et al. (2020, 2023) relate firm-level employment changes to the alteration of the employment structure in terms of occupations and incomes. Finally, the contract type also seems relevant when we consider job

creation and destruction. [Duhautois and Petit \(2023\)](#) show that job creation or destruction generally accounts for more than a third of the staff. This flow is mainly driven by CDD, even though the flow of CDI contributes to changes in total employment, especially when it decreases.

Which covariates determine the firm's worker allocation? Previous research in economics has identified that a set of firm characteristics can solely explain workforce reallocation. In their seminal article, [Davis and Haltiwanger \(1992\)](#) document that job re-allocations across plants are mainly driven by four firm characteristics: age, size, organizational form (single-unit versus multi-unit), and ownership. Other studies confirm these results. According to [Moscarini and Postel-Vinay \(2012\)](#), larger companies are more likely to contribute to job destruction, particularly in times of high unemployment. [Reynaud \(2013\)](#) also indicates that size matters, along with other characteristics (e.g. being listed) and accounting indicators, such as return on equity, productivity, and turnover on sales. Whereas job loss in the United States in the 1980s was concentrated among manufacturing firms, affecting blue-collar workers, greater heterogeneity across occupations has since been documented ([Farber and Hallock, 1999](#); [Kletzer, 1998](#)).

As reviewed by [Datta et al. \(2010\)](#), various explanations can be provided for downsizing. Worsening business conditions, degrading financial indicators, and firm attributes matter. Focusing on large German firms in the 2000s, [Goesaert et al. \(2015\)](#) find that the main reason for downsizing is a business downturn. In this case, job reductions tend not to alter productivity or profitability. When job reductions are not associated with poor economic conditions, they tend to target the restoration of productivity and profit margins. Based on a Belgian survey conducted in the 1990s, [Coucke et al. \(2007\)](#) shows that manufacturing firms were more likely to downsize than service firms. Parallel to this literature, some papers have argued that shareholders of publicly-listed companies may also influence their decisions to downsize ([Lazonick and O'Sullivan, 2000](#); [Froud et al., 2000](#)). As shown by [Jung \(2015\)](#), who focuses on a large sample of U.S. firms from the 1980s through the mid-2000s, the features of shareholding influence downsizing. Blockholding institutional investors (i.e., investors with more than 5% ownership) are more likely to be associated with fiercer downsizing because they cannot easily dump their shares of underperforming firms.

Outline The remainder of the paper is organized as follows. Section 2 describes our main data sources and presents descriptive statistics. Section 3 presents the two statistical models that we use to study the determinants of mass layoff and to analyze the determinants of job growth. Section 4 presents the results. Section 5 concludes.

2 Data

2.1 Sources

Our empirical analysis draws on four different administrative data sources: (i) the French match employer-employee dataset (DADS), (ii) administrative data on worker flows (MMO-DSN), (iii) balance sheets and income statements of firms (BIC-RN/BIC-IS), and (iv) information on their ownership structures (LIFI).

Déclaration Annuelle de Données Sociales (DADS): renamed recently *Déclaration Sociale Nominative*, systematically links employers and employees. The DADS is compiled from mandatory reports to the payroll tax collection agency (URSSAF Caisse Nationale) by all employers operating in France. The initial database contains information on approximately 64 million firms over the studied period (2007-2018). It contains general information on firms (i.e., sector, location, size), their employees (i.e., gender, age, profession, and socio-professional category), and their jobs.

Mouvements de Main-Oeuvre (MMO): We also refer to the monthly flow declarations, which record worker recruitments and contract terminations from establishments of 50 employees or more in Metropolitan France. The correspondence between the unique identifier of each company (SIREN number) and those of its establishments (SIRET number) allows us to conduct our analysis at the level of the company, which is the unit of observation for the accounting and financial data. Since 2007, MMO has provided information on the types of exit (end of a fixed-term contract, quit, dismissal for economic reasons, dismissal for personal reasons, mutually agreed-upon termination - *rupture conventionnelle*-, retirement, etc.). Therefore, we use MMO to identify firms that should implement a legally defined mass layoff (*plan de sauvegarde de l'emploi*, PSE).

Bénéfices Industriels et Commerciaux: Accounting information comes from the tax documents filed by companies and systematically collected by the Ministry of Finance. The database compiles the declarations of all operating firms with more than €818,000 in annual sales revenue and subject to the regular corporate tax regime up to 2015. This database provides accounting information on approximately 7.5 million firms between 2007 and 2015, i.e., approximately 940,000 firms each year. From 2016 the sample includes all companies regardless of their tax regime and adopted a new name (The *Bénéfices Industriels et Commerciaux, Tous Régimes* - BIC-IS). This second source covers a larger number of firms, approximately 8 million, from 2016 to 2018, i.e., approximately 2.7 million firms each year. From BIC-RN and BIC-IS, we extract the information needed to construct our accounting indicators that measure economic/financial performance.

Liaisons Financières (LIFI): is an annual survey that provides information on approximately 40,000 business groups operating in France and the shareholdings of holding companies and their subsidiaries, covering approximately 5 million firms over the entire study period, i.e., 333,000 firms each year. Consequently, LIFI makes it possible to distinguish family-run businesses and subsidiaries from independent companies, be they private or publicly listed.

2.2 Sample

Using the unique firm identifiers (SIREN), we match the data on workers' characteristics (DADS) with the accounting information (BIC-RN and BIS-IS). Because the calendar and fiscal years do not coincide, we compute the number of jobs in each company on a daily basis and then aggregate this count for each fiscal year.¹ After merging these two sources of information, our starting sample is composed by 12,448,165 firms (an average of 1,131,651 firms per year). We merge the flow information at the firm level, using workers' hirings and exits (MMO). The merge requires an additional step since the unit of observation in MMO is the establishment: we aggregate the data across all firms' establishments using the correspondence between the establishment unique identifier (SIRET) and the firm one (SIREN).

We apply basic restrictions to our data set. These restrictions reflect the needs of the statistical exercise proposed and the legal definition of mass layoff. We restrict our sample to firms with flow information, for which we observe financial and worker demographic characteristics. We also restrict our sample to all firms with at least 50 full-time workers on any day between 2007 and 2018. After merging and cleaning the data, our full sample consists of 681,931 firms (an average of 61,994 firms per year). The resulting panel is unbalanced.² This could potentially create selection bias in our results. As shown in Table B1 in Appendix B, if we compare the number of firms available each year to the total number of firms, the resulting percentage is relatively stable over time, between 5.4% and 7.1%.

2.3 Measuring job destruction

One of the main challenges in analyzing mass layoffs is defining such an event. The size and dispersion of jobs flow largely varies between countries, and it is sensitive to its institutional context (OECD, 2009). Is the threshold valid across countries? Are statistical reasons to set such thresholds? While there is no definitive answer to this question, the

¹Section A.2.2 in Appendix A, documents the data construction.

²Firms might not show in the data for several reasons. The most evident is firms that merge or disappear. A firm can also not appear in our sample if there is no financial information for the specific year or the firm does not have any employees for the period. Using a balanced panel for the time span considered (2007-2018) would be too restrictive, resulting in a smaller sample of 'only' 271,164 between 2007 and 2018.

definition may vary depending on the literature being considered. Two approaches can be clearly seen: one from the economic literature and one from the corporate change literature.

The economic approach is based on a clear threshold of employment reduction. [Jacobson et al. \(1993\)](#) defines mass layoffs as a reduction of 30% of the initial workforce. Using this threshold allows us to distinguish voluntary and involuntary separations. This definition has since been commonly used in the literature on job displacement ([Bertheau et al., 2022](#)). [Davis and Von Wachter \(2011\)](#) develop an even stricter set of criteria: (i) an employment contraction of 30 to 99% at the end of the mass layoff period (from t-2 to t), (ii) employment at the beginning of the mass layoff period (in t-2) greater than 130% of employment during the pre-layoff period (t-3), and (iii) no full recovery after the mass layoff (employment in t+1 is less than 90% of the employment level at the beginning of the mass layoff period in t-2). The first condition excludes spurious firm deaths, while the other two exclude temporary variations. Very similar conditions—with a minimum employment contraction threshold of 25%—are adopted by [Margolis and Montana \(2023\)](#) for France. Finally, [Brandily et al. \(2020\)](#) defines mass layoff as a 10% decrease.

Instead, the corporate change research defines downsizing as a reduction in the scale of a firm's operations that implies layoffs ([Espahbodi et al., 2000](#)). Different thresholds for job reductions exist. For instance, [Suarez-Gonzalez \(2001\)](#) studied a small sample of firms experiencing a 5% decrease in operations, whereas [De Meuse et al. \(2004\)](#) considered reductions of 3%. As reviewed by [Datta et al. \(2010\)](#), 3%, 5% and 10% are the most common percentages used in this literature to measure the share of the labor force made redundant in one or two consecutive years. The selection of the threshold is 'ad hoc', and is not tied to any institutional obligation. One exception is [Coucke et al. \(2007\)](#), who use the obligation of Belgian firms with more than 20 employees to report a collective dismissal, defined as a workforce reduction of more than 10% of employees. Alternatively, researchers rely on press releases and newspaper articles that announce sweeping layoffs ([Espahbodi et al., 2000](#); [Goesaert et al., 2015](#); [Jung, 2015](#)).

In the first part of the paper, we study mass layoffs. Unlike the existing literature, we adopt the French legal definition of mass layoffs, which is based on a legal requirement in the case of collective dismissals. We construct an indicator variable that determines if a firm had a mass layoff based on this definition. For the second part of the paper, we study job growth. Our dependent variable is the yearly firm full-time employment growth. The next sections describe the construction and considerations of our two dependent variables.

2.4 A legal definition of mass layoffs

Since the implementation of the Social Modernization Act in 2002 – *Loi de modernisation sociale* –, a scheme of employment protection is in place in France. The job protection plan (henceforth PSE, from the french '*plan de sauvegarde de l'emploi* ') consist of a series of administrative and in-kind obligations for companies that plan mass layoffs. The type of in-kind obligations considers, among others, the provision of alternatives to termination of employment, such as redeployment opportunities or training.

Three main conditions trigger the requirement for a firm to implement a PSE.³ First, a firm with 50 or more employees must dismiss at least 10 employees for economic reasons within 30 days of announcing the decision to the workers' representatives. Second, if a firm terminates at least 10 employees for three consecutive months without ever reaching 10 terminations during the same period of 30 days, then any new dismissal during the following three months triggers a PSE. Third, if a firm fires at least 18 employees in a given calendar year, any new dismissal during the first three months of the next year triggers a plan. We count dismissals for economic reasons (*licenciements pour motifs économiques*) and (early) retirements (*retraites et préretraites*) to identify PSEs. We identify the economic separations from the French Ministry of Labor's job flows (MMO) database. However, because of missingness and under reporting, we are only able to track PSEs between 2007 and 2017. It is important to note that this definition of a PSE may underestimate the number of layoffs, as it does not consider worker transfers between different establishments within the same firm. These transfers do not change the total number of firm employees, but they may locally worsen the living conditions of workers at establishments that reduce their workforce.

Only a very small percentage of firms, i.e., approximately 0.65% in our sample, were in a situation to implement a PSE between 2007 and 2017 (Table 1). Moreover, as shown in Table B2 in Appendix B, large year-to-year variations can be observed. Even if the firms that were in a position to adopt a PSE is relatively low, the number of workers in firms that had a PSE is around 5% of the workforce. If we consider yearly, the maximum is attained in 2015, where the number of workers in firms that had a PSE is 10% of the workforce. When focusing on job destruction, PSE firms account for approximately 8% on average, again with a higher percentage at the end of the study period.

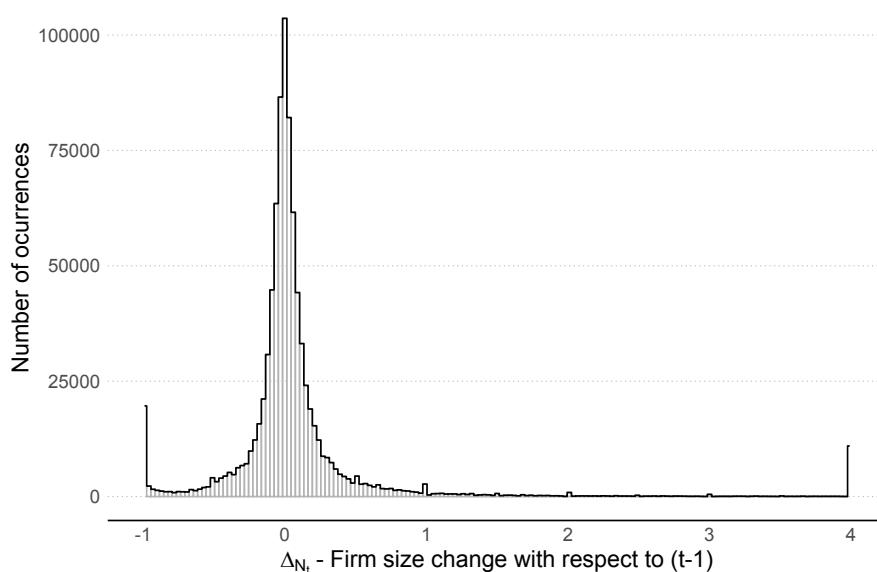
³Section A.4. in Appendix A provides a more detailed description of the computation of this variable, which identifies all firms meeting the legal criteria for putting a PSE in place.

2.5 Job creation and job destruction

The second outcome of interest is firm-level job growth. It is measured as the year-to-year change in workforce size in all the firms in our sample, from 2007 to 2018. This second sample is not restricted to size as in the previous case, but includes all the firms that had demographic, composition, and financial information during this period. The aim of using this variable is to investigate the asymmetrical effects of the independent variables on job destruction and job creation.

Figure 1 shows the distribution of the annual growth in the number of job positions within firms, with little variation over time. In our sample, firms in the first decile experienced an employment reduction of 16.0% on average. Then, the average decline, over the period, in the number of job positions within the firms of the 25th percentile is 5.7% on average over the entire study period. There is an average increase of 0.05% among firms in the 50th percentile, of 9.1% in the 75th percentile, and, finally, of 25.2% in the 90th percentile.

Figure 1: Yearly job growth distribution (2004-18).



Source: DADS, 2007 – 18.

Note: This figure depicts the yearly firm full time job growth over 2007-18.

On average over the entire period, shrinking firms (i.e., firms with a negative annual job growth rate) account for 41.84% of all firms (see Table 1). In addition, Figure B1 in Appendix B depicts the share of jobs destroyed by job destruction quantile over the entire study period, suggesting strong concentration in job destruction with little variation across years.

2.6 Socio-demographic and financial variables

Table 1 presents the descriptive statistics of the variables of interest that are used as covariates in the empirical exercise. The variables can be divided into three groups:

- **Firm characteristics:** These variables describe the firm’s sector of activity and firm size.
- **Workforce characteristics:** These variables describe the firm’s workforce, such as the average age and education level of employees.
- **Financial characteristics:** These variables describe the firm’s financial health, such as its debt-to-equity ratio and return on assets. From the variables we can also establish the direct ownership of the firm to a group or economic conglomerate.

Table 1 presents descriptive statistics on all the firms with at least 50 full-time any day between 2007 and 2018, from three sources: DADS, MMO and LIFI survey. The numbers in the table are the average frequencies of the modalities of variables that describe the firms and their workforces. All accounting-based indicators are expressed in mean values, except for sales revenues (expressed in current Euros) and shareholding variables (business group membership and direct ownership of known individuals) that are expressed in percentages. The first column presents the frequencies among all firms. The second one focuses on the firms that should implement PSE. The third and fourth columns divide the full sample between downsizing and non-downsizing firms. For instance, 49.47% of the firms that should implement a PSE concern the manufacturing sector, while it only consists of 22,34% of all firms.

We compute the gender composition, age distribution, and occupation structure of the firm’s workforce to characterize it. We use the aggregate French occupational classification to characterize the occupation, which classifies workers into the following levels: managers, middle-management professions, non-manual employees, and skilled or unskilled blue-collar workers.⁴ The descriptive statistics indicate large heterogeneity in firm characteristics when comparing PSE firms or shrinking/nonshrinking firms. Some differences by industry and firm size are observable: whereas PSEs are more frequent among manufacturing firms, job destruction is more pronounced among service firms. PSE firms and shrinking firms have a higher share of male and older workers (i.e., aged 35-64). In addition, PSE firms have a higher share of managers and middle-management professions and a lower share of non-manual employees. In contrast, we do not observe large differences in occupational ratios between

⁴We exclude ‘farmers and smallholders’, and ‘artisans, shopkeepers and company managers’ from our analysis. The present analysis is performed on non-farm firms only. We do not report artisans due to the specific sociodemographic characteristics of such workers.

Table 1: Descriptive Statistics

	All firms (1)	PSE (2)	Downsizing (3)	Non Downsizing (4)
<i>All firms</i>		0.65	41.84	58.16
<i>Industry</i>				
Retail	19.53	13.87	19.78	19.34
Manufacturing	22.24	49.47	24.97	20.29
Services	49.46	33.45	46.27	51.75
Construction	8.77	3.21	8.98	8.92
<i>Firm size</i>				
1-49 employees	54.30	5.74	52.72	55.43
50-249 employees	36.81	41.18	37.69	36.18
250-4,999 employees	8.62	48.85	9.31	8.13
More than 5,000 employees	0.26	4.24	0.28	0.25
<i>Gender</i>				
Female workers	38.34	36.25	37.75	38.77
<i>Age</i>				
Share of 15-24 y.o.	10.52	4.65	9.30	11.40
Share of 25-34 y.o.	26.66	20.80	24.82	27.99
Share of 35-44 y.o.	26.73	30.00	27.08	26.48
Share of 45-54 y.o.	24.41	30.87	26.08	23.20
Share of 55-64 y.o.	11.67	13.67	12.71	10.92
<i>Occupations</i>				
Executives and managers	17.08	24.48	16.30	17.64
Middle-management professions	17.89	21.76	18.08	17.75
Non-manual employees	29.61	16.32	28.88	30.13
Unskilled blue collar	10.07	11.02	10.16	10.00
Skilled blue collar	25.36	26.41	26.58	24.48
<i>Financial indicators</i>				
ROA	20.05	-3.00	14.96	23.72
Operating margin/Net surplus	13.79	-4.99	11.45	15.47
Sales revenues [†]	27.97	0.14	28.96	27.25
HHI on sales	0.03	0.02	0.02	0.03
Labour productivity [‡]	165.29	166.85	160.61	168.65
Total payroll ratio	65.96	82.31	67.39	64.93
Investment effort	26.48	23.24	23.07	28.93
Debt rate	69.58	88.04	71.21	68.42
Liquid assets/Debt	27.79	14.39	27.02	28.35
Business group membership	62.57	78.46	64.80	60.97
Direct ownership ($\geq 50\%$)	56.53	46.88	56.12	56.82

Source: DADS, BIC, MMO, 2007 – 18.

Note: calculations by the authors. The proportions are expressed in percentages. For the variables that describe the firms and their workforces, the numbers in the table are average frequencies. All accounting-based indicators are expressed in mean values, except for sales revenues (expressed in current Euros) and shareholding variables (business group membership and direct ownership of known individuals) that are expressed in percentages. † symbol indicates that the results are expressed in millions. ‡ symbol indicates that the results are expressed in thousands. Column (1) presents the results for the whole sample, column (2) presents the results for the sample of firms that fulfill the conditions for an administrative mass layoff according to French legislation (PSE). Columns (3) and (4) divide the full sample between shrinking and non-shrinking firms.

shrinking firms and all firms in our two samples.

Second, we focus on several accounting variables that capture the firms' economic performance.⁵ Two measures of profitability are used: the return on assets (ROA), which compares firm net result with total assets, and the margin rate, which is the ratio of the gross operating surplus to value added (i.e., turnover minus external charges). These two variables are expected to be negatively correlated with the probability of implementing a PSE and with job destruction. Then, we use sales revenue in level (t-1) as well as in annual variation. The first metric is an indicator of the size of the business which is expected to be positively associated with our dependent variable, while the second captures the state of the business and is expected to be negatively correlated with the explanatory variable. Next, we compute the Herfindahl-Hirschman Index (HHI) as a measure of the concentration of sales at the industry level to represent the competitive pressure. This index is expected to be negatively correlated with the dependent variables. Then, to measure labor productivity, we compute the ratio between the value added and the number of employees. In addition to labor productivity, we consider the total payroll expenditures (wages and social contributions) as a share of the value added. Our measure of labor productivity is expected to be negatively associated with the probability of implementing a PSE and with job growth, whereas we expect a positive correlation with the aggregate payroll ratio. Investment effort is then computed as the variation in capital assets, i.e., an increase in acquisitions, creations, provisions of funds, or transfers from one item to another, measured as the ratio to total assets. Investment effort is thus expected to be negatively related to our dependent variables. To measure the effect of indebtedness, we calculate the ratio of the total debt to capital (defined as the sum of debt and equity).⁶ Higher debt ratios are expected to be associated with a higher probability of implementing a PSE and with a higher job destruction rate. Finally, firms may face liquidity difficulties, with liquidity referring to the cash immediately available to repay loans and longer-term debt that fall due at the end of the year.⁷ As a primary variable, we compute the ratio of cash and marketable securities to short-term debt.⁸ A negative relationship is expected between our liquidity ratios and our different dependent variables.

Descriptive statistics (see table 1) clearly show that PSE firms and shrinking firms tend to be less profitable. These statistics also indicate that PSE firms have on average a much higher

⁵Table A2 in Appendix A provides more information on the definition and computation of each variable.

⁶We also computed disaggregated ratios: the total debt-to-equity ratio, the financial debt-to-equity ratio, as well the ratio of the interest payments to financial debt.

⁷This measurement, although crucial for practitioners, is rarely used, even in the management literature.

⁸As robustness checks, we also consider alternative computations: comparing cash and marketable securities corrected for bank account overdrafts and short-term debt with turnover or long-term debt as well as total current assets as a share of short-term debt.

level of sales revenues. Somewhat similarly, we observe the same characteristics among shrinking firms (relative to non-shrinking firms). Next, we find that these firms also face a more competitive environment, as indicated by lower HHI values. We also observe a higher level of labor productivity among PSE firms, unlike shrinking firms, which exhibit lower labor productivity than non-shrinking firms. Much less surprisingly, both PSE firms and shrinking firms have a higher total payroll ratio. These firms also display lower investment effort, a higher debt ratio (despite very small differences relative to non-shrinking firms) and a lower liquidity ratio.

Finally, when we merge with ownership data (LIFI) we are able to identify the subsidiaries of larger groups and businesses owned by known individuals (located in France). First, we define a variable that indicates whether a firm belongs to a business group (i.e., to a parent firm or a firm controlled with an ownership rate greater than 50%) (Naouas et al., 2016). Then, we construct a second ownership variable that indicates whether the self-reported fraction of equity held by French individuals is above 50% (Thesmar and Thoenig, 2011). PSE and shrinking firms can be observed to belong more frequently to a business group. In contrast, PSE and shrinking firms tend to have a lower ownership concentration.

3 Econometric specification

This section presents the statistical models that we use to determine the factors that determine the likelihood of a firm having a mass layoff following the legal definition that is used in France. We also present the econometric approach that we take to study the determinants of job growth in France.

3.1 What determines the likelihood of a mass-layoff ?

In order to analyze what are the determinants of a massive layoff we use a logistic model with fixed effects. To determine a mass layoff we use the french legal definition, constructed using administrative data (see Section 2.3). The outcome variable is then a binary variable that equals 1 if the firm j meets the PSE criteria in year t , and 0 otherwise. The underlying equation is given by:

$$\log \left(\frac{p}{1-p} \right) = \beta X_{jt} + \gamma Z_{jt-1} + \theta_j + \tau_t + \epsilon_{jt} \quad (1)$$

where, y_{jt} indicates whether firm j in year t met the conditions to face a PSE; The matrix of observed time variant characteristics X_{jt} captures the characteristics of the workforce of the firm. Z_{jt-1} refers to the financial indicators, all expressed in $t - 1$ (to deal with potential simultaneity issue). In order to account for the effects of the economic cycle we include time

fixed effect τ_t . Moreover to account for different hiring and firing dynamics, and in order to capture for unobserved heterogeneity across sectors we include a set of fixed effects θ_j at the one-digit sector level.

To characterize the firm's workforce, we compute the shares of workers in terms of gender, age, and occupation. For each grouping, we calculate the median value across all firms in each year. Then, we construct a set of dichotomous variables that describe the firm's structure. Each variable has a value of 1 if the firm's share is above the median value across firms, and 0 otherwise. For example, firm j has a value of 1 if its share of female workers is above the median value of female workers across all firms in a given year t . The advantage of using these dichotomous variables is that they capture the share relative to the median firm composition. This makes it easier to interpret the results. For example, in the case of the share of female workers, the resulting β coefficient indicates the effect of having a relatively higher share of female workers.⁹

Within the time variant characteristics we include the lag of financial variables. We use the balance-sheet information of firms to construct a set of financial indicators that are widely used in accounting and finance, to measure and identify economic or financial performance. Since the indicators vary and some of them are expressed in shares, and others are expressed in monetary terms, in order to ease the interpretation we normalize them. This also helps to interpret the coefficients that result of the regression, since all the results of model (1) are presented using the marginal effects. These marginal effects indicate the change in the probability of the outcome for a one-unit change in the independent variable, holding all other independent variables constant. We also control for the lag of firm size, using the number of total employees reported by each firm on their balance sheet.

3.2 The distributional determinants of job creation and destruction

To study the determinants of job growth across the distribution in France, we use a quantile regression approach. This approach allows us to examine how the relationship between firm characteristics, workforce composition, and financial condition varies across different quantiles of the job growth distribution. We expect that the relationship between these factors will be different for shrinking, stable, and expanding firms. For example, we may find that the workforce composition has a stronger positive effect on job growth for expanding firms than for shrinking firms. Using a quantile regression approach allows us to validate these heterogeneous effects and to gain a better understanding of the factors that

⁹Other literature that deals with the estimation of productivity-age profiles, and age-wage profiles at the wage level uses the firm characterization using the shares (van Ours and Stoeldraijer, 2011; Cardoso et al., 2011), and use GMM to estimate the coefficients of interest. We are distant from that literature, since our goal is to estimate the factors that influence the likelihood of a mass-layoff, with respect to the economy overall.

drive job growth in France.

More specifically, we want to estimate the partial effects of the explanatory variables on any unconditional quantile of the dependent variable following the approach introduced by [Firpo et al. \(2009\)](#) that utilizes ‘recentered influence function’ (RIF) regressions. This method estimates the partial effect of a small location shift in the distribution of the explanatory variables on the dependent variable. As emphasized by [Firpo et al. \(2018\)](#), this method focuses on small changes in the distribution of the dependent variable.

Considering the general model of job growth:

$$\Delta N_{jt} = \beta X_{jt} + \gamma Z_{jt-1} + \theta_j + \tau_t + \epsilon_{jt} \quad (2)$$

where ΔN_{jt} denotes the change in employment size in firm j . The outcome variable then is $\Delta N_{jt} = \frac{N_{jt} - N_{jt-1}}{N_{jt-1}}$. We calculate the Recentered Influence Function (RIF) for the firm job growth variable in each quantile of interest $\text{RIF}(\Delta N_{jt}, q_\tau, F)$, and regress it on our set of variables. This procedure allow us to estimate the conditional probability model given our covariates of interest of being below or above certain quantile.

As in the previous exercise, our model includes a set of dichotomous variables that describe the firm’s composition relative to the median firm in each dimension of the workforce structure. The model also includes financial indicators and a one-year lagged dependent variable to capture the potential inertia in job growth over time. We also include firm and year fixed effects to tackle unobserved invariant firm and year effects.

4 Results

4.1 The contributing and preventive factors of PSE

In this section, we explore how firm characteristics and firm workforce composition are related to the likelihood of initiating a mass layoff. To determine which firms are involved in a mass-layoff event, we resort to the legally-defined conditions for implementing a PSE. [Table 2](#) presents the regression results of the likelihood of having to implement a PSE.

First, firm size is positively correlated with our dependent variable, thus confirming that PSE are more likely to occur in big companies. Second, the composition of the workforce matters for PSE. Employing a higher share of male workers than the median share is negatively associated with the probability for a firm to have to implement a PSE (whereas the coefficients are weakly significant). The relationship between age categories and the

dependent variable is not monotonic: firms with a higher share of younger workers (i.e., workers between 15 and 34 years old) and, to a much lesser extent firms with a higher portion of senior workers (55 years old and above) are less likely to need to implement a PSE. Among firms that employ a large share of younger workers, firms that had to bear relatively large training costs have lower incentives to fire those younger workers. In addition, because employers may be more likely to hire young workers using fixed-term contracts, it can be costlier, in the French legal context, to lay off these workers. In contrast, firms with a larger share of middle-aged workers (i.e., workers between 35 and 54 years old) are more likely to trigger a PSE. Finally, companies with an overrepresentation of middle-management professions tend to be more often in the situation of triggering a PSE. Intriguingly, having a larger share of unskilled blue-collar workers is not statistically significant, whereas the coefficient for skilled blue-collar workers is significant and positive.

When focusing on economic indicators, we find that the variation of sales revenue, investment effort, and return to assets are all negatively correlated to the likelihood of PSE. On the other hand, a higher total payroll ratio is consistently found to be associated with a higher probability of implementing a PSE. We also find clear evidence that a higher debt ratio has a positive correlation with our dependent variable. In this case, companies may adjust their workforce to renegotiate interest rates or debt maturities with their creditors, who demand such adjustments. The positive relationship between sales revenue (in level) and PSE is another confirmation of the relevance of size (here proxied by the value of what is sold): running a big business exposes to the risk of PSE. Finally, we find that a higher degree of competitive pressure (reflected by a lower HHI) is associated with a higher probability of PSE. We also explore some additional firm characteristics related to governance (captured by a dummy variable for business group membership) and concentration (measured by a variable indicating whether the self-reported fraction of equity held by French individuals is above 50%): our results do not indicate any significant coefficients.

Additional regressions are then estimated to test the robustness of our results. First, alternative lags (t-2 and t-3) for our economic variables are considered. We want to investigate whether the likelihood of a PSE is affected by financial indicators with a delay, which would indicate that these indicators have a persistent effect on the likelihood of a PSE. Moreover, using longer lags can be justified, as managerial decisions can be made in the context of a longer-term strategic vision. As indicated in Table C1, we obtain robust results, with the same sign and magnitude as in our baseline results (except for investment effort and competitive pressure, which are no longer statistically significant). Interestingly, the significance of labor productivity increases, suggesting that the decision to trigger a PSE may be based on longer term trends, instead of short-term fluctuations in labor

productivity. In the same vein, all our accounting variables are then expressed as three-year averages computed. Our results (Table C2 in Appendix C) are somewhat different to those of our baseline regressions: among the main differences, we first find, as predicted, that a lower level of productivity is correlated with a higher probability of adopting a PSE. More surprisingly, we find that higher debt ratio is now associated with a lower probability of PSE (suggesting that companies with high and sustained levels of long-term indebtedness are not ailing companies, but on the contrary companies that can invest for growth). Third, our results indicate that a variation in sales revenues is positively related to a higher likelihood of PSE.

Next, firm restructuring decisions can be affected by the business cycle, which is captured with year fixed effects. From this perspective, it is interesting to investigate the specific role of the 2009 crisis by comparing the relationship between each accounting indicator and the dependent variable prior to and after 2009. Consequently, we interact each of our economic and financial variables with a dummy variable equal to 1 for observations after the 2009 crisis (and 0 otherwise). Our results suggest similar marginal effects prior to and after 2009, except for some variables (e.g. margin rate, or productivity), confirming that the crisis hardened the operating conditions of companies: margin rates would no longer be protected against the risk of PSE, while labor productivity became a preventive factor (Table C3 in Appendix C).

To assess the robustness of the estimated parameters of the financial indicators, we use alternative definitions for each indicator. We run regressions, replacing each indicator one at a time, and check the stability of the remaining estimates. The results of each exercise are presented in Table C4 in Appendix C. To measure profitability, we use two alternative indicators: return on equity (ROE), which compares net income to shareholder equity, and an alternative margin rate, which compares operating income to value added. Compared to our baseline regressions where ROA does not appear as significant, ROE has a negative and significant coefficient (column (1)), which is coherent. Nonetheless, we preferred not to use the ROE in the baseline regression since this performance indicator does not take into consideration the firms' levels of debt. Similarly, we also find that our alternative margin rate is negatively associated with our dependent variable, and appears as statistically significant compared to our baseline regression results (column (2)). Then, three alternative measures of indebtedness are used: (i) the total debt-to-equity ratio, (ii) the financial debt-to-equity ratio and (iii) the interest payments-to-financial debt ratio. Except for our first alternative variable, which analyzes the financial debt-to-equity ratio (column (3)) and which has a positive (but weakly significant) coefficient, the estimated effects of our different ratios do not appear to be statistically significant. Finally, three alternative measures of liquidity are used. The first (second) ratio compares cash and marketable securities corrected for bank

account overdraft and short-run debt with turnover (long-run debt), and finally, the last ratio measures total current assets as a share of short-run debt. We obtain conflicting results for our different debt ratios. The liquidity ratio, when expressed in proportion to debt, is positively associated with our dependent variable (column (7)), in contrast with our baseline results. However, our two alternative liquidity ratios do not appear to be significant (columns (6) and (7)).

4.2 Determinants of job creation and job destruction

Tables 3 display our quantile regression results for different quantiles ($q = 0.10; 0.25; 0.50; 0.75; 0.90$). Note that for shrinking firms (Q10 and Q25), a positive coefficient indicates that the variable is associated with a lower rate of job destruction. For these shrinking firms, a negative coefficient indicates that the corresponding variable tends to worsen the rate of job destruction. For growing firms (Q50 to Q90), a positive coefficient indicates that the independent variable correlates with a higher job creation rate. A negative coefficient signals a lower rate of job creation.

In Table 3, we focus on the relationship between workforce composition and job growth. First, the lagged value of the dependent variable shows a negative and significant coefficient, suggesting that firm size is correlated with job growth. If we focus on shrinking firms (columns (1)-(2)), numerous dimensions of the workforce composition seem to be related to employment changes. We find, however, some heterogeneous coefficients of workforce composition across age categories. Whereas the overrepresentation of young workers is always positively correlated to job growth, the overrepresentation of senior workers tends to be negatively associated except among the companies that reduce the most their workforce (column (1)). Then, the relationship between occupations and job growth is heterogeneous. An over-representation of managers or non-manual employees tend to accelerate job destructions among the firms that reduce their workforces the most, whereas more middle-management professions or blue-collar workers than the median tend to be positively associated with our dependent variable, hence reducing job destructions among shrinking firms.

When investigating the relationship between economic performance proxied by accounting indicators and job growth (Table 3), our results do not display heterogeneous coefficients across the quantiles of our dependent variable, except for productivity, the payroll and debt ratios. When focusing on shrinking firms, our findings suggest that higher

Table 2: Determinants of PSE - Logistic regression - Marginal effects

	(1)	(2)	(3)	(4)
Share of male workers	-0.002*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)
Share of 15-24 y.o.	-0.005*** (0.000)	-0.004*** (0.000)	-0.005*** (0.000)	-0.004*** (0.000)
Share of 25-34 y.o.	-0.003*** (0.000)	-0.002*** (0.000)	-0.003*** (0.000)	-0.002*** (0.000)
Share of 35-44 y.o.	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Share of 45-54 y.o.	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Share of 55-64 y.o.	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Share of executives and managers	0.002*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Share of middle-management professions	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Share of non-manual employees	-0.002*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)
Share of unskilled blue collar	0.001*** (0.000)	0.001** (0.000)	0.001*** (0.000)	0.001** (0.000)
Share of skilled blue collar	0.001*** (0.000)	0.000 (0.000)	0.001** (0.000)	0.000 (0.000)
Firm size	0.003*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
ROA	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Margin rate	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Sales revenues	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
Δ Sales revenues	-0.013*** (0.000)	-0.013*** (0.000)	-0.013*** (0.000)	-0.013*** (0.000)
HHI on sales	-0.001*** (0.000)	0.000 (0.000)	-0.003*** (0.000)	-0.002*** (0.000)
Labour productivity	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Aggregate payroll/VA	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Debt ratio	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Investment effort	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Liquid assets/Debt	-0.001*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)
Business group membership	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Direct ownership (\leq 50%)	0.000 (0.000)	0.001*** (0.000)	0.000 (0.000)	0.000 (0.000)
Observations	494,939	494,939	494,939	494,939
Industry FE	No	Yes	No	Yes
Year FE	No	No	Yes	Yes

Significance:

*p<0.1; **p<0.05; ***p<0.01

Source: MEADOW from DADS, MMO, BIC, LiFi, 2007 – 2017, accessed through CASD .

Note: Calculations by the authors. The table presents estimated coefficients of different versions of model 1. The model examines the factors that affect the likelihood of a mass layoff. The first column only includes the time-varying coefficients. The second column estimates the variation within industry, meaning that it controls for all unobserved factors that are constant within an industry. The third column, estimates the variation within years, accounting for unobserved constant characteristics at the year level. The last column includes a full set of industry and year-fixed effects.

Table 3: Determinants of firms job growth - Quantile regression

	Δ full time employment				
	$Q_{\tau=.10}$ -0.15972	$Q_{\tau=.25}$ -0.05715	$Q_{\tau=.50}$ 0.00568	$Q_{\tau=.75}$ 0.09165	$Q_{\tau=.90}$ 0.25173
Full time employment (t-1)	-0.054*** (0.001)	-0.023*** (0.000)	-0.016*** (0.000)	-0.054*** (0.000)	-0.229*** (0.002)
Share of male workers	-0.011*** (0.001)	-0.003*** (0.001)	-0.001*** (0.000)	0.001 (0.001)	0.004* (0.002)
Share of 15-24 y.o.	0.063*** (0.001)	0.027*** (0.001)	0.023*** (0.000)	0.033*** (0.001)	0.042*** (0.002)
Share of 25-34 y.o.	0.020*** (0.002)	0.008*** (0.001)	0.011*** (0.000)	0.023*** (0.001)	0.049*** (0.002)
Share of 35-44 y.o.	0.014*** (0.001)	0.004*** (0.000)	0.001*** (0.000)	-0.003*** (0.001)	-0.014*** (0.002)
Share of 45-54 y.o.	0.032*** (0.002)	0.004*** (0.001)	-0.005*** (0.000)	-0.020*** (0.001)	-0.037*** (0.002)
Share of 55-64 y.o.	0.024*** (0.001)	0.002*** (0.001)	-0.003*** (0.000)	-0.015*** (0.001)	-0.024*** (0.002)
Share of executives and managers	-0.031*** (0.001)	-0.008*** (0.001)	-0.001** (0.000)	0.007*** (0.001)	0.007*** (0.002)
Share of middle-management professions	0.008*** (0.001)	-0.000 (0.000)	-0.003*** (0.000)	-0.011*** (0.001)	-0.026*** (0.002)
Share of non-manual employees	0.003** (0.001)	-0.003*** (0.001)	-0.006*** (0.000)	-0.022*** (0.001)	-0.061*** (0.002)
Share of unskilled blue collar	0.029*** (0.001)	0.009*** (0.001)	0.005*** (0.000)	0.008*** (0.001)	0.028*** (0.002)
Share of skilled blue collar	0.006*** (0.002)	-0.003*** (0.001)	-0.007*** (0.000)	-0.021*** (0.001)	-0.068*** (0.002)
ROA	0.003*** (0.001)	0.002*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002** (0.001)
Margin rate	0.047*** (0.001)	0.017*** (0.000)	0.008*** (0.000)	0.005*** (0.001)	-0.006*** (0.002)
Sales revenues	0.132*** (0.002)	0.048*** (0.001)	0.022*** (0.000)	0.032*** (0.001)	0.167*** (0.002)
Δ Sales revenues	0.309*** (0.003)	0.123*** (0.001)	0.092*** (0.001)	0.204*** (0.002)	0.623*** (0.005)
HHI on sales	0.006*** (0.002)	0.004*** (0.001)	0.002*** (0.001)	-0.004*** (0.001)	-0.049*** (0.003)
Labor productivity	-0.036*** (0.001)	-0.004*** (0.001)	0.002*** (0.000)	0.011*** (0.001)	0.020*** (0.002)
Aggregate payroll/VA	-0.004*** (0.002)	0.007*** (0.001)	0.009*** (0.000)	0.026*** (0.001)	0.093*** (0.002)
Debt ratio	-0.025*** (0.001)	-0.008*** (0.000)	-0.000** (0.000)	0.006*** (0.000)	0.019*** (0.001)
Investment effort	0.009*** (0.001)	0.006*** (0.000)	0.005*** (0.000)	0.012*** (0.000)	0.030*** (0.001)
Liquid assets/Debt	0.013*** (0.001)	0.005*** (0.000)	0.003*** (0.000)	0.001** (0.000)	-0.005*** (0.001)
Business group membership	-0.005*** (0.001)	-0.005*** (0.001)	-0.004*** (0.000)	-0.008*** (0.001)	-0.021*** (0.002)
Direct ownership (> 50%)	0.001 (0.002)	0.003*** (0.001)	0.003*** (0.000)	0.010*** (0.001)	0.045*** (0.003)
Constant	-0.036*** (0.005)	0.012*** (0.002)	0.061*** (0.001)	0.321*** (0.003)	1.203*** (0.008)
Observations	489,940	489,940	489,940	489,940	489,940
R-squared	0.075	0.075	0.092	0.145	0.147

Significance:

*p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 18.

Note: calculations by the authors. Columns 1 to 5 present the unconditional quantile regression estimations at the 10th, 25th, 50th, 75th, and 90th percentile of the firm's job growth distribution. At the top of each column, we display the corresponding value of the outcome variable in the corresponding percentile. Standard errors in parentheses.

sales and margin rates, coupled with higher investment and higher liquidity, are associated with a slower rate of job destruction. These indicators usually signal sound business conditions. As expected, indebtedness worsens job destructions. Labor productivity has a negative relationship with job growth at the extremes of the distribution, with an opposite coefficient in the rest of the distribution. Surprisingly, the coefficient associated with the payroll ratio is symmetrical: It tends to increase job destruction among shrinking firms and accelerate job creation among the fastest growing firms. The relationship between competition pressure and job growth is not significant for the companies that reduces their job positions the most. A contrario, the more concentrated the sector in which growing firms operate, the less jobs they create.

As for our two ownership variables, we find that business group membership is associated with a higher rate of job destruction whereas ownership concentration is correlated with a lower rate of job destruction among shrinking firms. Consistently, job growth among growing firms is positively affected by ownership concentration (while business group membership is correlated with a lower rate of job creation). This first result is consistent with the findings of [Thesmar and Thoenig \(2011\)](#), who find that shareholder representatives who oppose employment growth are less influential among firms with more concentrated ownership structures and among stand-alone firms.

As in our previous PSE analysis, we estimate additional regressions to test the robustness of our results. When considering alternative lags (t-2 and t-3) for the accounting indicators, we find very similar results among shrinking firms (in terms of sign and magnitude) ([Table C6](#) in Appendix C). Next, we investigate the effect of the 2009 crisis on shrinking and growing firms ([Table C8](#)). Among shrinking firms (columns (1) and (2)), the coefficient signs for most variables are similar when comparing the average effect of each independent variable and the effect associated with the interacted variable, implying that the crisis made employment reductions even more sensitive to variations in the accounting indicators than they were pre-crisis. In contrast, the effects of economic variables on job creation among growing firms were muted after the crisis (the sign of the coefficient on the interaction term is the opposite of that on the main effect), especially for the debt ratio, labor productivity, the ratio of total payroll to value added, and investment effort (columns (3) to (5)).

Finally, as in our previous PSE regressions, we test the robustness of our results by using alternative accounting indicators ([Tables C9 to C11](#) in Appendix C). We find results for ROE and the ratio of gross operating surplus to value added (Panels A and B) that are very similar to those in [Table 3](#). When using alternative debt ratios, we find some contrasting results: our findings are very comparable to those in our baseline regressions when measuring total

debt as a share of equity (Panel C). In contrast, both of the additional measures for debt (the financial debt-to-equity ratio as well as the ratio of interest payments to financial debt) are correlated with a lower rate of job destruction (column (5) in Panels D and E). Similarly, when focusing on alternative liquidity ratios—which reflect, however, different time horizons—our results show that greater liquidity is associated with slower job creation (Panels F and H).

5 Conclusion

Using firm-level data on a large sample of French firms from 2007 to 2018, the primary objective of our article is to quantify downsizing. We combine two approaches. We first focus on its legal definition. Even though the *'plan de sauvegarde de l'emploi'* (PSE) is specific to the French labor regulation, legal definitions of downsizing exist in most Western countries. Consequently, algorithms analogous to the one we present in this article could be used to track downsizing in administrative micro-data. Moreover, quantile regressions circumvent the limitations of the statistical definition of downsizing based on *ad hoc* thresholds. The combination of the two approaches indicates that legally defined downsizing (PSE in France) only accounts for a small proportion of all job destructions.

We used similar specifications with the same independent variables in our different regressions. Consequently, the results of those different regressions are comparable. The combination of the two approaches of downsizing facilitates the characterization of the contributing and preventing factors of downsizing. The variables that reduce the risk of triggering a PSE (i.e., that have negative marginal effects in the logit model) and the magnitude of job cuts (shrinking firms with positive coefficients in the quantile regressions), we label them 'preventive' factors: overrepresentation of employees aged 15 to 34 or 55-64, overrepresentation of non-manual employees, a positive variation of sales revenue, high ROA, margin rate, HHI, investment effort and liquidity ratio. *A contrario*, 'contributing' factors are those that increase the risk of implementing a PSE (i.e., those with positive marginal effects in the logit model) and that accentuate the job destruction among those companies that lay off the most workers (shrinking firms with negative coefficients in the quantile regressions). These are: the firm size, the overrepresentation of executives and managers, the total payroll/value-added ratio, the debt ratio and being the subsidiary of a group. All the other variables can be labeled equivocal since they are either statistically significant with opposite effects on PSE and the largest layoffs (e.g. the overrepresentation of male workers), or not always significant (like labor productivity for instance). This result confirms that PSE and the most intense job reductions are similar phenomena that do not follow the same logic.

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Appendix A

A Variables and sources

Table A2 shows the definition of each performance indicator used in the paper, its definition, and the formula from which it is computed. The inputs for the formula uses the field names of the financial statements database (BIC). The following section presents in detail the data sources used in the paper.

A.1 Sources

A.1.1 DADS Postes

The Déclarations annuelles de données sociales (DADS) is a compulsory procedure that must be completed annually by all businesses operating in France. This obligation serves both fiscal and administrative purposes: providing information on the characteristics of the firms and their establishments (i.e., sector of activity, location, size), the people that they employ (i.e., gender, age, geographical department of residence) and the jobs that they perform (i.e., duration, employment conditions, qualifications, remuneration).

More precisely, in the DADS Postes series, the unit of observation is the job position (“*poste*”), which is defined as a succession of periods of employment for a given employee. The quantitative variables (i.e., wage, working hours) for each period are summed together, while for the categorical variables (such as job qualifications, contract type, employment conditions, and individual-level socioeconomic qualifications), only those corresponding to the period of employment with the highest pay are recorded. Companies and their establishments are identified by a unique identifier (SIREN for firms and SIRET for establishments), and they are qualified by the legal category of the firm and its APE code (*activité principale de l’entreprise*), which characterizes the sector in which the firm operates. If there are two employment periods, their start and end dates are registered. Otherwise, the limits on the first period are known, and a ‘second’ period contains the aggregate of all the others. ‘Ancillary jobs’ (*postes annexes*), i.e., jobs in which workers are employed less than 30 working days or 120 hours and paid less than three times the monthly minimum wage are distinguished from sustained jobs (*postes non-annexes*). Here, we study only the latter.

Until mid-2015, the data in the DADS Postes series were taken from compulsory declarations from companies with 50-plus employees and from surveys of smaller companies. Beginning in the third quarter of 2015, there is one consolidated source of information: the ‘Nominative Social Declaration’ (*Déclaration Sociale Nominative*, or DSN). This change in

Table A1: Definition of the performance indicators

	Variable	Definition	Computation (BIC codes)
Profitability	Return on assets (ROA)	Net income over total assets (i.e., net intangible and tangible assets + working capital)	$GG / [((AN+AP+AR+AT+AV+AX) - (AO+AQ+AS+AU+AW+AY) + (AB+CX+AF+AH+AJ+AL) - (AC+CQ+AG+AI+AK+AM) + (BL + BN + BR + BT + BV + BX + BZ) - (DW + DX + DY + DZ + EA))]$
	Return on equity (ROE)	Net income over shareholder equity	DI/DL
	Margin rate	Gross operating surplus over value added Operating income over value added	$[(FL + FM + FN + FO) - (FS+FT+FU+FV+FW+FZ)] / [(FL+FM+FN+FC) - (FS+FT+FU+FV+FW)]$ $GG / [(FL+FM+FN+FC) - (FS+FT+FU+FV+FW)]$
Turnover and competitive pressure	Sales revenues	Turnover achieved through sales	FL
	Competitive pressure	Herfindahl-Hirschman Index (HHI) for sales takes on values between 1/Nk (where Nk is the number of companies in activity k) and 1. We then compute an index for the average competitive pressure faced by the firm in the market in which it is active. This average is the average of the sectoral indices.	Sales = Sales on goods (FC) + Quantity of goods sold (FF) + Quantity of services sold (FI) $HHI = \sum_{k=1}^N \left(\frac{Sales_k}{\sum_{k=1}^N Sales_k} \right)^2$
Productivity and payroll ratio	Labor productivity	Value added over the average number of employees	$((FL+FM+FN+FC) - (FS+FT+FU+FV+FW)) / YP$
	Payroll ratio	Aggregate payroll (gross wages, payroll tax, and employees profit-sharing) over value added	$(FY + FZ + HJ) / ((FL+FM+FN+FC) - (FS+FT+FU+FV+FW))$
Investment	Investment effort	Increase in acquisitions, creations, provisions of funds, and transfers from one item to another over total assets	$LP / [((AN+AP+AR+AT+AV+AX) - (AO+AQ+AS+AU+AW+AY) + (AB+CX+AF+AH+AJ+AL) - (AC+CQ+AG+AI+AK+AM))]$
Indebtedness	Total debt/Capital	Total debt over capital, where capital is the sum of debt and equity	$(DS+ DT + DU + DV+DW+DX+DY+DZ + EA - EH + J7) / (DL + DS+ DT + DU + DV+DW+DX+DY+DZ + EA - EH + J7)$
	Total debt/Equity	Total debt over equity	$(DS+ DT + DU + DV+DW+DX+DY+DZ + EA - EH + J7) / DL$
	Financial debt/Equity	Financial debt over equity	$(DU+DV-EH) / DL$
Liquidity	Interest paid on debt	Interest payments over financial debt	$GR / (DU+DV-EH)$
	Cash and marketable securities/Short-run debt	Cash and marketable securities over short-run debt	$(CF - CG) / EG$
	Current assets/Turnover	(Cash and marketable securities - bank account overdrafts - short-run debt) over sales revenue	$[(CF - CG) + (CD - CE) - EH - EG] / FL$
	Current assets/Long-run debt	(Cash and marketable securities - bank account overdrafts - short-run debt) over long-run debt	$[(CF - CG) + (CD - CE) - EH - EG] / (DU + DV)$
Ownership	Total current assets/Short-run debt	Total current assets over short-run debt	$(CJ-CK) / EG$
	Business group membership	Equal to 1 if a firm is a parent firm or is controlled by another firm with at least 50% ownership	
Ownership	Ownership concentration	Equals 1 if the self-reported fraction of equity held by French individuals is above 50%.	

protocol for collecting information has occasionally deteriorated the quality of the microdata for the transition year of 2016 (Bonnet and Vuillemin, 2019)¹⁰.

A.1.2 MMO

The Labor Movements (MMO) databases provide very detailed information on each employee's entry and exit at the establishment level and their motivations (recruitment with permanent or fixed-term contracts, transfers to other establishments, quits, dismissals for economic or other reasons, retirements, terminations by agreement, etc.) as well as the sociodemographic characteristics of employees. The MMO databases are produced by the DARES, the statistical office of the French Labor Ministry, and are derived from several sources. Until the second quarter of 2015, they were based on historical sources, i.e., declarations of labor movements (DMMOs, which are compulsory for all establishments with more than 50 employees) and an associated survey (EMMO, for establishments with fewer than 50 employees). Beginning in the third quarter of 2015, they were reconstituted from the data on the Nominative Social Declaration (DSN).

The data source that we use is the 2018 version of the MMO. It combines data on labor movements from 1993 to 2018. These data record all recruitments and terminations of employment contracts at the establishment level. They make it possible to measure entries and exits according to the type of contract (fixed-term contract/permanent contract), the duration of the contract, and the reason for termination. For each reference year, the data are separated into two files: one with the characteristics of the establishments and another with the movements associated with the establishments. The MMO universe is establishments in the private sector, excluding temporary workers and agriculture, in Metropolitan France. These are establishments that were employers for more than two years at the time the database was created, with the exception of establishments with more than 50 employees. Historically, labor movement statistics have covered private sector establishments in Metropolitan France excluding agriculture and excluding temporary workers.

A.1.3 BIC

The *Bénéfices industriels et commerciaux, régime normal* (BIC-RN) are composed of the tax returns processed by the General Directorate of Public Finance (DGFIP, Ministry of Finance) and by INSEE for companies that declare more than €818,000 in revenue.¹¹ These documents

¹⁰Bonnet, Odran Bonnet and Tony Vuillemin (2019), "Salaires dans le secteur privé En 2016, le salaire net moyen augmente de 0,5% en euros constants", Insee Première, n°1750, Avril.

¹¹Source : https://www.evl.fr/chiffres-taux/fiscal/impot_benefbic.html

contain the standardized balance sheet and operating account. The BIC-IS (*Bénéfices Industriels et Commerciaux, Tous Régimes*) started in 2016 and includes all companies regardless of their tax regime.

These two databases provide information on firm identifiers (SIREN), balance sheets, and income statements. These two databases are used to calculate all our economic/financial variables: ROE/ROA, the margin rate, turnover from sales, the HHI for sales, investment effort, the debt ratios, and the liquidity ratios as computed in Table A2 (where codes are taken from the BIC).

A.1.4 LIFI (Financial Relationships Survey)

Liaisons Financières (LIFI) provides information on capital ownership between holding companies, subsidiaries and joint-venture firms incorporated in France. Until 1999, LIFI was based on an annual survey of 40,000 companies (private, publicly listed and state controlled) and their shareholders. From 1999 onward, INSEE has combined this survey with information provided by the commercial database Bureau Van Dijk. Since 2014, LIFI combines information from Banque de France (tax returns collected on a voluntary basis as part of bank credit rating activities), from the Bureau Van Dijk (certified accounts), from DGFIP tax returns (from 2015 onward), and from a residual survey on groups of firms controlled by the State or by French sovereign-fund like entities (APE, BPI, CDC).

We use the following variables from the first source, 'LIFI_Liaison', which provides information on parent firms and their subsidiaries: the share of capital (*txcm*) or votes (*txvm*) reported as held by the parent company, the share of votes reported by the subsidiary company (*txvf*) and the control rate (*txcontra*). Then, from the 'LIFI_Enterprises' database, which gives some information on the ownership characteristics of each company, we extract the nationality of the parent company (*natiotg*, relabeled *natiogr*) and its subsidiaries (*natio*) and the fraction of equity that is held by French individuals (*acppf*, relabeled *part_pp_fr*), foreign individuals (*acppe*, relabeled *part_pp_etr*), French firms (*acpmf*, relabeled *part_pm_fr*), foreign firms (*acpme*, relabeled *part_pm_etr*) and the state (*recme*). Finally, we use information on the position of the company in the business group (*contour*), where the options include the parent company, a company for which the parent company controls more than 50% (i.e., a member of the 'core' group), a company that is controlled by another company that belongs to the group (*contour élargi* and *mouvance*), or finally, independent.

A.2 Calculation of the firm annual full time job growth employment rate

The DADS, MMO and LIFI series follow a 360 days calendar-year periodicity, whereas BIC contains data corresponding to fiscal years (“*exercices comptables*”), with dates expressed using the Gregorian calendar (DD/MM/YYYY). To respect the temporal order that causality imposes, we matched the employee data from DADS Postes with the accounting data from BIC and the ownership data from LIFI on the closing days of each fiscal year.

A.2.1 Identifying the periods of employment

The first step is to identify all the periods during which positions in a company (which may include several establishments) were held according to the information taken from the DADS Postes. The source collects information on the period of employment for each employee as reported by each establishment: (i) the start (DATDEB) and end (DATFIN) date for each period of employment, (ii) the motivations for starting and ending, and (iii) additional characteristics such as occupations and job descriptions. Therefore, a position refers to the sum of the periods of employment held by an employee within the same establishment. All the quantitative variables that are available for each period, i.e., salary, duration of work, and the number of hours worked, are then aggregated for the entire period of employment. For the qualitative variables, we use only the period with the highest salary. Finally, we focus only on ‘sustained jobs’ (*postes non annexes*), which refer to jobs lasting more than 30 working days and 120 hours or for which payment exceeds the payment received over three months at minimum wage.

Based on the new database taken from the DADS Postes (starting in 2002), it is possible to restrict our sample to firms that are present in both the BIC (from 2007 to 2018). Some corrections are then made: all positions with no start or end date (which prevents us from calculating the daily number of positions) as well as ‘ancillary jobs’ (*postes annexes*) are excluded. Then, some corrections can be made to each period of employment to calculate the daily number of positions, especially when different periods may overlap (which are then considered to be the same period).

After deleting some potential duplicates (the same position in the same year may be registered in two regions/departments), we obtain a new database that provides the year, firm identifier (SIREN), employee identifier, start and end dates of the (aggregated) period of employment and employee sociodemographic characteristics such as occupation (PCS), gender and age.

A.2.2 Daily employment count

The second step is to calculate the daily number of job positions on the basis of the information in the previous database for each period of employment. For each year x SIREN, we count the number of periods that include day d (with d ranging from 1 to 360). More precisely, in addition to the periods comprising the last 30 days of the year under consideration, we add those corresponding to positions occupied between the 331st and 360th days but which were declared in the following year. As a result, a new database is created with the following variables: year, day, SIREN, and positions. Then, we restrict our sample to firms that recorded 50 positions or more at least once during our period of study.

This new database has the main advantage of having the same structure as other databases such as BIC and LIFI (with which it is merged). This database does not, however, provide any detailed variables for each employee, such as age, occupation or gender. To include this information, we create an additional database that provides supplementary information on the average number of employees by gender, by age category, and by occupation category per year for each firm. Following the same methodology as above, we calculate the daily number of job positions for male/female employees, by age category (15-24, 25-34, 35-44, 45-54, and 55-64), and by occupation category (managers, middle-management professions, non-manual employees and unskilled/skilled blue-collar workers).

A.2.3 Merging with BIC

The third step is to create a new database integrating the daily number of job positions for each year (from day 1 to day 360), the workforce composition by gender, age and occupation, and the accounting data from BIC. Starting with the BIC data, we restrict our sample to firms that reported 50 positions or more at least once during our period of study. Then, in order to merge our two sources (DADS Postes and BIC), the date formats must be harmonized. In the DADS Postes database, the start and end dates of the employment periods are given by the number of days elapsed since the first day of a given year on the basis of 360 days per year. However, in the BIC (as in reality), a year never includes exactly 360 days, and not all months are 30 days long. It is thus necessary to create a correspondence table that associates each day of the Gregorian calendar with its equivalent in the simplified calendar with 360 days. By doing so, each starting (DEBEX) and ending (CLOTEX) date for each fiscal year is converted into a day from the 360-day calendar (from day 1 to day 360). This allows us to merge the BIC databases with the previous database (created in step 2) to calculate the daily number of job positions on the first (DEBEX) and last (CLOTEX) day of the fiscal year, as well as for each gender, age and occupation category.

Next, some corrections are made to detect outliers in the format values for DEBEX and

CLOTEX and firms with a fiscal year longer than 12 months and to deal with cases when the fiscal year does not correspond to a calendar year. In this case, the fiscal year covers two (or more) years; therefore, the calendar year at the end of the fiscal year is different from the calendar year at the beginning of the fiscal year.

Finally, we obtain a database that provides the number of full-time jobs at the start and the end of the fiscal year. More precisely, we use the number of full-time jobs at the end of the fiscal year (CLOTEX) to calculate the annual growth rates of firm employment as follows:

$$\Delta N_j = \log \left(\frac{N_t}{N_{t-1}} \right) = \log N_t - \log N_{t-1}$$

A.3 Definition of and conditions for a PSE

A.3.1 Legal definition of a ‘plan de sauvegarde de l’emploi’

Since the 2002 Social Modernization Act (*Loi de modernisation sociale*), the ‘job protection plan’ (*plan de sauvegarde de l’emploi* in French, PSE) has imposed obligations on the management of companies that plan mass layoffs. The plan must provide, among other things, alternatives to employment termination, redeployment opportunities or training. Since the passage of the ‘Securing Employment Act’ (*Loi de Sécurisation de l’Emploi*) on June 14, 2013, the plan must be validated or approved by the administrative authorities (whereas previously, a simple notification was requested). In fact, the regional directorates for the economy, employment, labor and solidarity (*directions régionales de l’économie, de l’emploi, du travail et des solidarités* or DREETS) validate the plan if it is imposed unilaterally and approve the plan if it is negotiated with recognized employee representatives.

The basic mechanism that must be activated for a PSE to be put in place is as follows:

- A firm with more than 50 employees must displace 10 or more employees for economic reasons (dismissal for economic reasons, mutually agreed-upon terminations [*rupture conventionnelle*], early-early retirement, etc.) during a period of 30 days (i.e., the current day plus the next 29 days);

To reduce the risk that firms split their layoffs over a longer time span so as to remain below this threshold, the labor regulation also requires a PSE if:

- A firm with more than 50 employees displaces 10 or more employees for economic reasons during a 90-day period (if these displacements did not occur for 30 consecutive days with a displacement between the 91st and 180th day);

- A firm with more than 50 employees displaces at least 19 employees for economic reasons during a calendar year and reports at least one additional displacement in the first quarter of the following year.

When a firm meets these conditions, it must implement a PSE.

A.3.2 Identifying firms with a PSE

The primary source used to identify firms with a PSE is the MMO, which gathers quarterly information on worker movements (entries and exits) for each firm. The first step is to calculate the daily number of exits in each firm. An observation, i.e., a worker's exit, is usable if the date of the exit from the establishment is correctly filled in, focusing only on exits for economic reasons (mainly dismissals for economic reasons, mutually agreed-upon terminations, early-early retirement, etc.). Since 2016, the category of early retirement has been included in the larger category of retirement. This new version of the database, however, provides more detailed information for the other categories (i.e., dismissals and mutually agreed-upon terminations). Then, using the information on worker movements, it is possible to calculate the daily number of exits by type for each firm (aggregating different establishments) and for each year.

Second, we use our previous database on the daily number of job positions since only firms with more than 50 employees must put a PSE in place. To do this, we calculate the daily number of job positions in all firms, which is available in the database produced in the first step. According to the legal definition of a PSE, the company must have terminated the employment of at least 18 people during one year and have terminated the employment of at least one person in the first quarter of the following year. To verify whether these conditions are met, it is therefore necessary to use the table representing the daily economic exits for each company in each year of the period under consideration to calculate (1) the number of exits for economic reasons occurring in the first quarter of the year and (2) the number of exits for economic reasons over the whole year. With the use of these indicators, it is possible to check the different conditions under which firms must put a PSE in place on a daily basis. This implies two steps: first, Boolean variables representing each of the conditions for a PSE are constructed. Second, all the firms that meet the different conditions for implementing a PSE are identified. Following the legal definition of a PSE, different mechanisms related to the different conditions can be activated.

Table A2: Industry classification

Aggregate sector	French classification of activities (NAF 1993/NAF Rev. 1, 2003)	French classification of activities (NAF Rev. 2, 2008)
Retail	Retail trade, repair of motor vehicles and household goods (section G)	Wholesale and retail trade; repair of motor vehicles and motorcycles (section G)
Manufacturing	Mining and quarrying (section C) Manufacturing (section D)	Mining and quarrying (section B) Manufacturing (section C)
Services	Accommodation and food service activities (section H)	Transportation and storage (section H)
	Transportation and communication (section I)	Accommodation and food service activities (section I)
	Financial activities (section J)	Information and communication (section J)
	Real estate, rental and business services (section K)	Financial and insurance activities (section K)
	Public administration and defense; compulsory social security (section L)	Real estate activities (section L)
	Education (section M)	Professional, scientific and technical activities (section M)
	Human health and social work activities (section N)	Administrative and support service activities (section N)
	Collective, social and personal services (section O)	Public administration and defense; compulsory social security (section O)
	Activities of households (section P)	Education (section P)
		Human health and social work activities (section Q)
	Arts, entertainment and recreation (section R)	
	Other service activities (section S)	
	Activities of households as employers; undifferentiated goods- and service-producing activities of households for own use (section T)	
Construction	Construction (section F)	Construction (section F)

Source: INSEE

B Additional descriptive statistics

Table B1: Descriptive Statistics

Year	Sample		Shrinking firms in sample	
	N. Firms	Share	N. Firms	Share
2007	42,438	8.57	23,749	55.96
2008	41,925	8.47	20,715	49.41
2009	44,334	8.96	20,056	45.24
2010	44,448	8.98	22,912	51.55
2011	45,734	9.24	25,828	56.47
2012	46,759	9.45	27,327	58.44
2013	47,252	9.55	22,800	48.25
2014	47,423	9.58	22,686	47.84
2015	46,945	9.49	23,471	50.00
2016	43,437	8.78	19,777	45.53
2017	44,244	8.94	22,810	51.56

Source: DADS, BIC, MMO, 2007 – 17.

Note: The left part of the table presents the number of firms in each year in the sample, and the its share over the whole sample. The last two column present the numbers of firm in the sample that are shrinking, each year. In this table being shrinking consider that the workforce of the firm decreased in at least one unit with respect to the previous year.

Table B2: Employment level and destruction in firms facing a PSE

Year	Number of firms with PSE		Number of full time workers		Number jobs destroyed		Average workers in firm with PSE	Average jobs destroyed in firms with PSE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	In firms with PSE	All firms	In firms with PSE	Share	In firms with PSE	In all firms	Share		
2007	464	458,756	9,608,807	4.77	42,204	475,610	8.87	988.70	90.96
2008	412	313,238	9,508,255	3.29	30,168	727,009	4.15	760.29	73.22
2009	753	468,050	9,567,372	4.89	38,890	507,523	7.66	621.58	51.65
2010	460	397,600	9,718,819	4.09	31,183	447,226	6.97	864.35	67.79
2011	374	240,960	10,160,557	2.37	19,303	460,855	4.19	644.28	51.61
2012	342	326,953	11,446,898	2.86	14,726	442,985	3.32	956.00	43.06
2013	397	316,464	11,485,414	2.76	22,130	606,433	3.65	797.14	55.74
2014	446	372,168	11,591,715	3.21	27,064	539,259	5.02	834.46	60.68
2015	812	1,171,719	11,759,208	9.96	138,847	644,606	21.54	1,443.00	170.99
2016	361	837,778	9,817,028	8.53	100,174	2,338,350	4.28	2,320.71	277.49
2017	740	918,742	11,064,593	8.30	54,778	752,129	7.28	1,241.54	74.02
Total	5561	5,822,428			519,467				
Average				5.00			7.00	1047.01	93.41

Source: DADS, BIC, MMO, 2007 – 17.

Note: Column (1) presents the number of firms that are eligible to implement a PSE according to our algorithm. Then, the three following columns show the number of full time workers, in PSE firms (column (2)) and in all firms (column (3)). Column (4) computes the share of the number of full time workers in PSE firms in all firms. Then, columns (5) to (7) compare the number of jobs destroyed, again in PSE firms (column (5)), in all firms (column (6)). Column (7) computes the share of jobs destroyed in PSE firms in all firms. Finally, column (8) compares the number of full time workers in PSE firms (column (2)) to the number of PSE firms (column (1)). Column (9) computes the number of jobs destroyed in PSE firms (column (5)) as a proportion of the number of PSE firms (column (1)).

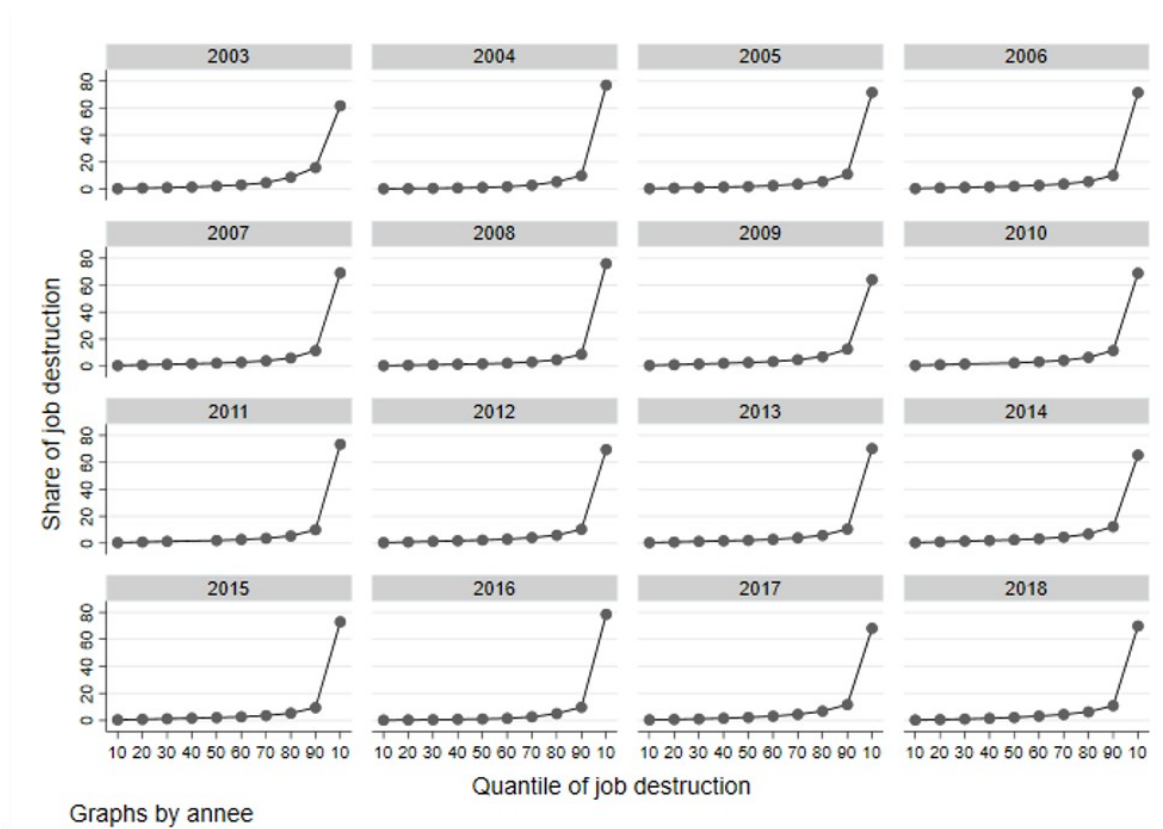
Table B3: Job destruction by quantile of the job growth distribution

	$\tau \leq 10$	$10 < \tau \leq 25$	$25 < \tau \leq 50$	$50 < \tau \leq 75$	$90 < \tau$
Full time workers	17,787,056	32,122,876	40,869,504	29,322,214	24,271,076
Job destruction	8,369,276	1,626,147	150,584	0	0
Incidence of job loss	47.05	5.06	0.37	0.00	0.00

Source: DADS, BIC, MMO, 2007 – 17.

Note: The table displays the number of full-time workers and job destruction across the distribution of firm job growth.

Figure B1: Share of jobs destroyed by job destruction quantile



Source: DADS, 2007 – 18.

Note: This figure depicts the yearly firm full time job growth over 2007-18.

Table B4: Table B.4 - descriptive job growth qt

	Job growth						
	All firms	Q10	Q25	Q50	Q75	Q90	
Industry							
Retail	19.53	17.91	21.63	21.54	20.99	15.88	
Manufacturing	22.24	21.49	27.67	25.99	22.27	13.96	
Services	49.46	51.68	41.40	43.90	47.89	61.87	
Construction	8.77	8.91	9.30	8.57	8.85	8.29	
Firm size							
1-49 employees	54.30	64.27	46.67	45.36	51.27	64.26	
50-249 employees	36.81	30.23	42.17	41.80	39.85	29.83	
250-4,999 employees	8.62	5.36	10.82	12.44	8.65	5.73	
More than 5,000 employees	0.26	0.15	0.34	0.40	0.24	0.19	
Gender							
Male workers (%)	61.66	61.96	62.59	61.50	60.85	61.36	
Female workers (%)	38.34	38.04	37.41	38.50	39.15	38.64	
Age							
15-24 old aged (%)	10.52	9.57	9.20	9.49	11.47	12.89	
25-34 old aged (%)	26.66	25.66	24.07	24.61	27.35	31.77	
35-44 old aged (%)	26.73	26.84	27.21	27.15	26.74	25.83	
45-54 old aged (%)	24.41	25.18	26.83	26.22	23.59	20.15	
55-64 old aged (%)	11.67	12.74	12.69	12.61	10.86	9.35	
Occupations							
Executives and managers (%)	17.08	17.94	14.60	15.99	16.13	20.93	
Middle-management professions (%)	17.89	17.76	18.14	18.30	17.86	17.48	
Non-manual employees (%)	29.61	29.71	28.44	29.17	30.68	29.98	
Unskilled blue collar workers (%)	10.07	10.18	10.18	9.55	9.83	10.37	
Skilled blue collar workers (%)	25.36	24.39	28.63	26.98	25.50	21.22	
Measures of economic/financial performances							
ROA (%)	20.05	12.22	17.88	20.56	24.61	25.01	
Operating margin/Net surplus (%)	13.79	8.72	13.73	16.06	16.00	14.51	
Sales revenues	27,965.92	18,578.04	33,820.49	38,164.80	29,728.26	19,447.24	
HHI on sales	0.03	0.03	0.02	0.02	0.03	0.03	
Labour productivity (/1000)	165.29	153.19	166.77	177.59	173.40	156.91	
Total payroll ratio (%)	65.96	71.90	63.39	61.53	62.63	69.93	
Investment effort (%)	26.48	22.90	23.19	24.72	27.44	34.06	
Debt rate (%)	69.58	75.80	67.22	65.48	67.30	72.01	
Liquid assets/Debt (%)	27.79	27.45	27.10	29.00	27.75	27.58	
Business group membership	62.57	61.78	66.71	65.53	63.32	55.36	
Direct ownership of known individuals \geq 50%	56.53	59.39	53.69	53.53	54.60	59.73	

Source: DADS, BIC, MMC, 2007 – 17.

Note: The table displays the descriptive statistics of the sample across the quantiles of the job growth distribution.

C Additional regression tables

Table C1: Determinants of PSE: Economic/financial variables with alternative lags

	(1) n=2	(2) n=3
Share of male workers	-0.002*** (0.000)	-0.001*** (0.000)
Share of 15-24 y.o.	-0.004*** (0.000)	-0.004*** (0.000)
Share of 25-34 y.o.	-0.002*** (0.000)	-0.002*** (0.000)
Share of 35-44 y.o.	0.001*** (0.000)	0.001*** (0.000)
Share of 45-54 y.o.	0.001*** (0.000)	0.001*** (0.000)
Share of 55-64 y.o.	-0.001*** (0.000)	-0.001*** (0.000)
Share of executives and managers	0.001*** (0.000)	0.002*** (0.000)
Share of middle-management professions	0.001*** (0.000)	0.001*** (0.000)
Share of non-manual employees	-0.001*** (0.000)	-0.002*** (0.000)
Share of unskilled blue collar	0.000 (0.000)	0.000 (0.000)
Share of skilled blue collar	-0.000 (0.000)	-0.001 (0.000)
ROA	-0.002*** (0.000)	-0.001*** (0.000)
Margin rate	0.004*** (0.000)	0.004*** (0.000)
Sales revenues	-0.010*** (0.000)	-0.009*** (0.000)
Sales revenues (t/t-1)	-0.001** (0.000)	-0.001* (0.000)
HHI on sales	-0.000 (0.000)	-0.000 (0.000)
Labour productivity	0.001*** (0.000)	0.001*** (0.000)
Aggregate payroll/VA	0.002*** (0.000)	0.001*** (0.000)
Debt ratio	-0.001*** (0.000)	-0.001*** (0.000)
Investment effort	-0.000*** (0.000)	-0.000*** (0.000)
Liquid assets/Debt	0.004*** (0.000)	0.004*** (0.000)
Business group membership	0.001*** (0.000)	0.001*** (0.000)
Direct ownership (> 50%)	0.000 (0.000)	0.000 (0.000)
Observations	494,939	494,939
Sociodemographic variables	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes

Significance: *p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: Calculations by the authors. The table presents estimated coefficients of model 1. The model examines the factors that affect the likelihood of a mass layoff by including a full set of industry and year-fixed effects where the financial/economic indicators are expressed in $t - 2$ (column (1)) and in $t - 3$ (column (2)).

Table C2: Determinants of PSE: Economic/financial variables three-year-average

	(1)	(2)
ROA	-0.001* (0.001)	-0.001* (0.001)
Margin rate	0.026 (0.037)	0.038 (0.042)
Sales revenues	0.014*** (0.001)	0.013*** (0.001)
Sales revenues (t/t-1)	0.003*** (0.000)	0.004*** (0.000)
HHI on sales	0.000 (0.001)	-0.000 (0.002)
Labour productivity	-0.003*** (0.001)	-0.002** (0.001)
Aggregate payroll/VA	0.002** (0.001)	0.003*** (0.001)
Debt ratio	-0.004*** (0.001)	-0.004*** (0.001)
Investment effort	-0.001* (0.001)	-0.001** (0.001)
Liquid assets/Debt	-0.002** (0.001)	-0.002** (0.001)
Business group membership	0.001 (0.001)	0.001 (0.001)
Direct ownership (> 50%)	0.003*** (0.001)	0.002 (0.002)
Firm size	0.006*** (0.001)	0.006*** (0.001)
Observations	63,832	63,832
Sociodemographic variables	Yes	Yes
Industry FE	No	Yes
Year FE	No	Yes

Significance: *p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: Calculations by the authors. The table presents estimated coefficients of model 1. The model examines the factors that affect the likelihood of a mass layoff where the financial/economic indicators are expressed in three-year-average. The first column only includes the time-varying coefficients. The second column includes a full set of industry and year-fixed effects.

Table C3: Determinants of PSE: Economic/financial variables - Crisis effect

	Prior to 2009	After 2009
	(1)	(2)
ROA	-0.001*** (0.000)	-0.000** (0.000)
Margin rate	-0.003*** (0.001)	-0.002*** (0.000)
Sales revenues	0.004*** (0.001)	0.004*** (0.000)
Sales revenues (t/t-1)	-0.008*** (0.001)	-0.009*** (0.000)
HHI on sales	-0.002** (0.001)	-0.002*** (0.000)
Labour productivity	0.001* (0.001)	0.000 (0.000)
Aggregate payroll/VA	0.003*** (0.001)	0.002*** (0.000)
Debt ratio	0.001** (0.001)	0.002*** (0.000)
Investment effort	-0.001** (0.000)	-0.001*** (0.000)
Liquid assets/Debt	-0.000 (0.000)	-0.000*** (0.000)
Business group membership	0.001 (0.001)	0.001*** (0.000)
Direct ownership (> 50%)	-0.000 (0.001)	0.000 (0.000)
Observations	494,939	494,939
Sociodemographic variables	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes

Significance: *p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: Calculations by the authors. The table presents estimated coefficients of model 1. The model examines the factors that affect the likelihood of a mass layoff where the financial/economic indicators are expressed in three-year-average. The first column only includes the time-varying coefficients. The second column includes a full set of industry and year-fixed effects.

Table C4: Determinants of PSE: Alternative economic/financial variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ROA		-0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)		
Margin rate	-0.002*** (0.000)		-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Sales revenues	0.004*** (0.000)	0.004*** (0.000)	0.003*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
Sales revenues (t/t-1)	-0.009*** (0.000)	-0.009*** (0.000)	-0.008*** (0.000)	-0.009*** (0.000)	-0.009*** (0.000)	-0.009*** (0.000)	-0.009*** (0.000)	-0.009*** (0.000)
HHI on sales	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Labour productivity	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001** (0.000)	0.000 (0.000)	0.000 (0.000)
Aggregate payroll/VA	0.002*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Debt ratio	0.002*** (0.000)	0.002*** (0.000)				0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Investment effort	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Liquid assets/Debt	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)			
Firm size (average number of employees)	0.004*** (0.000)	0.004*** (0.000)	0.003*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
ROE	-0.000*** (0.000)							
Operating margin (operating income)		-0.002*** (0.000)						
Financial debt/Equity			-0.000 (0.000)					
Total debt/Equity				-0.000*** (0.000)				
Interest on debt					0.001*** (0.000)			
Liquidity ratio (% of turnover)						0.001*** (0.000)		
Liquidity ratio (% of debt)							-0.000* (0.000)	
Liquidity ratio (Current assets/Debt)								-0.000 (0.000)
Observations	494,193	494,939	404,251	494,193	413,593	494,939	463,349	494,939
Sociodemographic variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Significance:

*p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: Calculations by the authors. The table presents estimated coefficients of model 1. The model examines the factors that affect the likelihood of a mass layoff where all the financial/economic indicators are interacted with a dummy variable which takes 0 for years prior to 2009 (column (1)) or 1 for years after 2009 (column (2)) by including a full set of industry and year-fixed effects. To measure profitability, we use the return on equity (ROE), which compares net income with shareholder equity, and an alternative margin rate, which compares operating income to value added. Then, three alternative measures of indebtedness are used: (i) the total debt-to-equity ratio, (ii) the financial debt-to-equity ratio and (iii) the interest payments-to-financial debt ratio. Finally, three alternative measures of liquidity are used. The first (second) ratio compares cash and marketable securities corrected for bank account overdraft and short-run debt with turnover (long-run debt), and finally, the last ratio measures total current assets as a share of short-run debt.

Table C5: Determinants of PSE: linear probability model

	(1)	(2)	(3)	(4)
Share of male workers	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Share of 15-24 y.o.	-0.005*** (0.000)	-0.005*** (0.000)	-0.005*** (0.000)	-0.005*** (0.000)
Share of 25-34 y.o.	-0.004*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)
Share of 35-44 y.o.	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Share of 45-54 y.o.	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Share of 55-64 y.o.	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Share of executives and managers	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Share of middle-management professions	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Share of non-manual employees	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Share of unskilled blue collar	-0.000 (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.001*** (0.000)
Share of skilled blue collar	0.000 (0.000)	-0.001* (0.000)	0.000 (0.000)	-0.000 (0.000)
ROA	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)
Margin rate	-0.005*** (0.000)	-0.006*** (0.000)	-0.005*** (0.000)	-0.006*** (0.000)
Sales revenues	0.004*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)
Sales revenues (t/t-1)	-0.020*** (0.001)	-0.019*** (0.001)	-0.019*** (0.001)	-0.019*** (0.001)
HHI on sales	-0.000 (0.000)	0.001* (0.000)	-0.003*** (0.000)	-0.003*** (0.000)
Labour productivity	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Aggregate payroll/VA	0.003*** (0.000)	0.003*** (0.000)	0.004*** (0.000)	0.003*** (0.000)
Debt ratio	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Investment effort	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Liquid assets/Debt	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Business group membership	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Direct ownership (> 50%)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)
Firm size	0.009*** (0.000)	0.009*** (0.000)	0.009*** (0.000)	0.009*** (0.000)
Constant	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.010*** (0.001)
Observations	494,939	494,939	494,939	494,939
R-squared	0.025	0.026	0.026	0.026
Industry FE	No	Yes	No	Yes
Year FE	No	No	Yes	Yes

Significance:

*p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: Calculations by the authors. The table presents estimated coefficients using OLS estimator of model 1. The model examines the factors that affect the likelihood of a mass layoff. The first column only includes the time-varying coefficients. The second column estimates the variation within industry, meaning that it controls for all unobserved factors that are constant within an industry. The third column, estimates the variation within years, accounting for unobserved constant characteristics at the year level. The last column includes a full set of industry and year-fixed effects.

Table C6: Determinants of job growth: Economic/financial variables with alternative lags

N. Lags	Δ Full time employment									
	$Q_\tau = 0.10$		$Q_\tau = 0.25$		$Q_\tau = 0.50$		$Q_\tau = 0.75$		$Q_\tau = 0.90$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Full time employment (t-1)	-0.050*** (0.001)	-0.055*** (0.001)	-0.021*** (0.000)	-0.023*** (0.000)	-0.021*** (0.000)	-0.022*** (0.000)	-0.044*** (0.001)	-0.046*** (0.001)	-0.158*** (0.002)	-0.162*** (0.002)
ROA	0.005*** (0.001)	0.003*** (0.001)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.005*** (0.001)	0.002** (0.001)
Margin rate	0.030*** (0.001)	0.026*** (0.001)	0.012*** (0.001)	0.010*** (0.001)	0.005*** (0.000)	0.005*** (0.000)	0.003*** (0.001)	0.002*** (0.001)	-0.001 (0.002)	-0.001 (0.002)
Sales revenues	0.125*** (0.002)	0.130*** (0.002)	0.047*** (0.001)	0.050*** (0.001)	0.022*** (0.000)	0.024*** (0.000)	0.027*** (0.001)	0.030*** (0.001)	0.121*** (0.002)	0.127*** (0.003)
Sales revenues (t/t-1)	0.408*** (0.003)	0.331*** (0.003)	0.164*** (0.001)	0.137*** (0.001)	0.100*** (0.001)	0.084*** (0.001)	0.191*** (0.002)	0.160*** (0.001)	0.516*** (0.004)	0.427*** (0.004)
HHI on sales	0.001 (0.002)	0.002 (0.002)	0.000 (0.001)	-0.002** (0.001)	0.001** (0.001)	-0.001 (0.001)	-0.006*** (0.001)	-0.004*** (0.001)	-0.037*** (0.003)	-0.010*** (0.003)
Labour productivity	-0.035*** (0.002)	-0.038*** (0.002)	-0.004*** (0.001)	-0.005*** (0.001)	0.002*** (0.000)	0.001*** (0.000)	0.013*** (0.001)	0.014*** (0.001)	0.040*** (0.002)	0.043*** (0.003)
Aggregate payroll/va	-0.003 (0.002)	-0.002 (0.002)	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.000)	0.007*** (0.000)	0.025*** (0.001)	0.025*** (0.001)	0.092*** (0.003)	0.095*** (0.003)
Debt ratio	-0.019*** (0.001)	-0.017*** (0.001)	-0.007*** (0.000)	-0.006*** (0.000)	-0.003*** (0.000)	-0.002*** (0.000)	0.004*** (0.000)	0.004*** (0.001)	0.012*** (0.001)	0.010*** (0.001)
Investment effort	0.002*** (0.001)	0.001 (0.001)	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.005*** (0.000)	0.003*** (0.000)	0.008*** (0.001)	0.005*** (0.001)
Liquid assets/Debt	0.010*** (0.001)	0.008*** (0.001)	0.004*** (0.000)	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.001 (0.000)	-0.000 (0.000)	-0.003*** (0.001)	-0.003*** (0.001)
Business group membership	-0.002 (0.002)	-0.001 (0.002)	-0.004*** (0.001)	-0.003*** (0.001)	-0.002*** (0.000)	-0.002*** (0.000)	-0.004*** (0.001)	-0.004*** (0.001)	-0.011*** (0.002)	-0.008*** (0.002)
Direct ownership (> 50%)	0.000 (0.002)	-0.001 (0.002)	0.003*** (0.001)	0.002*** (0.001)	0.003*** (0.000)	0.002*** (0.000)	0.008*** (0.001)	0.008*** (0.001)	0.035*** (0.003)	0.033*** (0.003)
Constant	-0.039*** (0.006)	-0.019*** (0.006)	0.003 (0.002)	0.009*** (0.003)	0.089*** (0.001)	0.092*** (0.002)	0.261*** (0.003)	0.265*** (0.003)	0.869*** (0.008)	0.878*** (0.009)
Observations	317,660	271,172	317,660	271,172	317,660	271,172	317,660	271,172	317,660	271,172
R-squared	0.074	0.069	0.076	0.071	0.091	0.083	0.126	0.121	0.120	0.116

*p<0.1; **p<0.05; ***p<0.01

Significance:

Source: DADS, BIC, MMO, 2007 – 17.

Note: All the regressions presented in this table control for sociodemographic characteristics, industry-fix effects, and year-fix effects.

Table C7: Determinants of job growth: Economic/financial variables three-year-average

	Δ Full time employment				
	$Q_{\tau} = 0.10$ (1)	$Q_{\tau} = 0.10$ (2)	$Q_{\tau} = 0.50$ (3)	$Q_{\tau} = 0.75$ (4)	$Q_{\tau} = 0.90$ (5)
Full time employment (t-1)	-0.027*** (0.002)	-0.015*** (0.001)	-0.019*** (0.001)	-0.031*** (0.001)	-0.113*** (0.003)
ROA	0.004** (0.002)	0.003*** (0.001)	0.002*** (0.000)	0.002*** (0.001)	0.001 (0.002)
Margin rate	0.218* (0.117)	0.104** (0.048)	0.059* (0.031)	0.041 (0.050)	0.054 (0.137)
Sales revenues	0.044*** (0.004)	0.016*** (0.002)	0.006*** (0.001)	0.010*** (0.002)	0.073*** (0.005)
Sales revenues (t/t-1)	-0.039*** (0.002)	-0.015*** (0.001)	-0.006*** (0.000)	-0.001 (0.001)	0.010*** (0.002)
HHI on sales	0.009* (0.005)	0.002 (0.002)	0.004*** (0.001)	0.007*** (0.002)	0.013** (0.006)
Labour productivity	-0.024*** (0.003)	-0.007*** (0.001)	-0.002*** (0.001)	-0.002* (0.001)	-0.023*** (0.004)
Aggregate payroll/VA	-0.021*** (0.003)	-0.004*** (0.001)	0.001 (0.001)	0.007*** (0.001)	0.027*** (0.004)
Debt ratio	0.023*** (0.003)	0.015*** (0.001)	0.011*** (0.001)	0.010*** (0.001)	0.018*** (0.004)
Investment effort	0.004** (0.002)	0.003*** (0.001)	0.003*** (0.000)	0.005*** (0.001)	0.011*** (0.002)
Liquid assets/Debt	0.011*** (0.002)	0.004*** (0.001)	0.002*** (0.000)	-0.000 (0.001)	-0.006*** (0.002)
Business group membership	-0.007* (0.003)	-0.004*** (0.001)	-0.003*** (0.001)	-0.006*** (0.001)	-0.017*** (0.004)
Direct ownership (> 50%)	-0.002 (0.005)	0.003 (0.002)	0.003** (0.001)	0.006*** (0.002)	0.028*** (0.005)
Constant	-0.134*** (0.013)	-0.032*** (0.005)	0.068*** (0.003)	0.189*** (0.005)	0.670*** (0.015)
Observations	63,035	63,035	63,035	63,035	63,035
R-squared	0.039	0.041	0.060	0.082	0.092

Significance:

*p<0.1, **p<0.05, ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: All the regressions presented in this table control for sociodemographic characteristics, industry-fix effects, and year-fix effects.

D Number of observations by year and source of data

Table C8: Determinants of job growth: Economic/financial variables - Crisis effect

	Δ Full time employment				
	$Q_\tau = 0.10$ (1)	$Q_\tau = 0.10$ (2)	$Q_\tau = 0.50$ (3)	$Q_\tau = 0.75$ (4)	$Q_\tau = 0.90$ (5)
Full time employment (t-1)	-0.054*** (0.001)	-0.023*** (0.000)	-0.016*** (0.000)	-0.054*** (0.000)	-0.229*** (0.002)
ROA	0.003** (0.001)	0.002*** (0.001)	0.002*** (0.000)	0.002*** (0.001)	0.004* (0.002)
ROA \times Post ₀₉	0.001 (0.002)	0.000 (0.001)	-0.000 (0.000)	-0.001 (0.001)	-0.002 (0.002)
Margin rate	0.051*** (0.003)	0.017*** (0.001)	0.009*** (0.001)	0.010*** (0.001)	-0.004 (0.004)
Margin rate \times Post ₀₉	-0.004 (0.003)	-0.001 (0.001)	-0.001* (0.001)	-0.005*** (0.001)	-0.002 (0.004)
Sales revenues	0.121*** (0.002)	0.045*** (0.001)	0.023*** (0.001)	0.027*** (0.001)	0.144*** (0.004)
Sales revenues \times Post ₀₉	0.013*** (0.002)	0.003*** (0.001)	-0.000 (0.001)	0.006** (0.001)	0.027*** (0.004)
Sales revenues (t/t-1)	0.414*** (0.007)	0.163*** (0.003)	0.112*** (0.002)	0.237*** (0.004)	0.790*** (0.011)
Sales revenues (t/t-1) \times Post ₀₉	0.034*** (0.008)	0.011*** (0.003)	0.003 (0.002)	-0.001 (0.004)	-0.003 (0.013)
HHI on sales	0.006* (0.003)	0.003*** (0.001)	0.001 (0.001)	-0.006*** (0.002)	-0.049*** (0.005)
HHI on sales \times Post ₀₉	0.001 (0.004)	0.001 (0.001)	0.002*** (0.001)	0.002 (0.002)	0.002 (0.006)
Labour productivity	-0.026*** (0.003)	-0.003*** (0.001)	0.002** (0.001)	0.008*** (0.001)	0.004 (0.004)
Labour productivity \times Post ₀₉	-0.013*** (0.003)	-0.001 (0.001)	0.000 (0.001)	0.004** (0.002)	0.020*** (0.005)
Aggregate payroll/VA	-0.005* (0.003)	0.006*** (0.001)	0.009*** (0.001)	0.021*** (0.001)	0.065*** (0.005)
Aggregate payroll/VA \times Post ₀₉	0.000 (0.003)	0.001 (0.001)	-0.000 (0.001)	0.006** (0.002)	0.035*** (0.005)
Debt ratio	-0.021*** (0.002)	-0.007*** (0.001)	-0.001 (0.001)	0.004*** (0.001)	0.014*** (0.004)
Debt ratio \times Post ₀₉	-0.005* (0.002)	-0.001 (0.001)	0.000 (0.001)	0.002 (0.001)	0.006 (0.004)
Investment effort	0.009*** (0.002)	0.006*** (0.001)	0.006*** (0.000)	0.016*** (0.001)	0.045*** (0.002)
Investment effort \times Post ₀₉	-0.001 (0.002)	-0.000 (0.001)	-0.001* (0.000)	-0.004*** (0.001)	-0.017*** (0.003)
Liquid assets/Debt	0.015*** (0.002)	0.006*** (0.001)	0.003*** (0.000)	-0.000 (0.001)	-0.012*** (0.003)
Liquid assets/Debt \times Post ₀₉	-0.003 (0.002)	-0.001 (0.001)	-0.000 (0.000)	0.001 (0.001)	0.008*** (0.003)
Business group membership	-0.009** (0.004)	-0.005*** (0.002)	-0.003*** (0.001)	-0.005** (0.002)	-0.003 (0.007)
Business group membership \times Post ₀₉	-0.004*** (0.002)	-0.005*** (0.001)	-0.004*** (0.000)	-0.009*** (0.001)	-0.025*** (0.002)
Direct ownership (> 50%)	-0.001 (0.005)	0.001 (0.002)	0.000 (0.001)	0.003 (0.002)	0.026*** (0.007)
Direct ownership (> 50%) \times Post ₀₉	-0.000 (0.002)	0.003*** (0.001)	0.003*** (0.000)	0.011*** (0.001)	0.050*** (0.003)
Constant	-0.035*** (0.005)	0.012*** (0.002)	0.061*** (0.001)	0.320*** (0.003)	1.200*** (0.008)
Observations	489,940	489,940	489,940	489,940	489,940
R-squared	0.075	0.075	0.092	0.145	0.147

Significance:

*p<0.1, **p<0.05, ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: All the regressions presented in this table control for sociodemographic characteristics, industry-fix effects, and year-fix effects.

Table C9: Determinants of job growth: Alternative economic/financial variables

	Δ Full time employment				
	$Q_\tau = 0.10$ (1)	$Q_\tau = 0.10$ (2)	$Q_\tau = 0.50$ (3)	$Q_\tau = 0.75$ (4)	$Q_\tau = 0.90$ (5)
<i>Panel A. ROE</i>					
Full time employment (t-1)	-0.047*** (0.001)	-0.019*** (0.000)	-0.019*** (0.000)	-0.042*** (0.001)	-0.147*** (0.002)
ROE (t-1)	0.004*** (0.001)	0.003*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.003*** (0.001)
Constant	-0.056*** (0.005)	-0.004* (0.002)	0.086*** (0.001)	0.262*** (0.003)	0.857*** (0.007)
Observations	389,910	389,910	389,910	389,910	389,910
R-squared	0.079	0.078	0.092	0.128	0.121
<i>Panel B. Operating margin ratio (using operating income)</i>					
Δ Full time employment (t-1)	-0.049*** (0.001)	-0.020*** (0.000)	-0.020*** (0.000)	-0.042*** (0.001)	-0.147*** (0.002)
Operating margin (operating income) (t-1)	0.036*** (0.001)	0.012*** (0.000)	0.006*** (0.000)	0.006*** (0.000)	0.001 (0.001)
Constant	-0.049*** (0.005)	-0.002 (0.002)	0.087*** (0.001)	0.264*** (0.003)	0.858*** (0.007)
Observations	390,418	390,418	390,418	390,418	390,418
R-squared	0.080	0.078	0.092	0.128	0.121
<i>Panel C. Financial debt to equity</i>					
Δ Full time employment (t-1)	-0.046*** (0.001)	-0.019*** (0.000)	-0.019*** (0.000)	-0.041*** (0.001)	-0.141*** (0.002)
Financial debt/Equity (t-1)	-0.003*** (0.001)	-0.001*** (0.000)	-0.001*** (0.000)	-0.003*** (0.000)	-0.010*** (0.001)
Constant	-0.043*** (0.006)	0.000 (0.002)	0.088*** (0.001)	0.260*** (0.003)	0.829*** (0.008)
Observations	323,230	323,230	323,230	323,230	323,230
R-squared	0.069	0.070	0.087	0.127	0.121

Significance:

*p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: All the regressions presented in this table control for sociodemographic characteristics, industry-fix effects, and year-fix effects.

Table C10: Determinants of job growth: Alternative economic/financial variables

	Δ Full time employment				
	$Q_{\tau} = 0.10$ (1)	$Q_{\tau} = 0.10$ (2)	$Q_{\tau} = 0.50$ (3)	$Q_{\tau} = 0.75$ (4)	$Q_{\tau} = 0.90$ (5)
<i>Panel D. Total debt to equity</i>					
Full time employment (t-1)	-0.047*** (0.001)	-0.019*** (0.000)	-0.019*** (0.000)	-0.042*** (0.001)	-0.147*** (0.002)
Total debt/Equity (t-1)	-0.002** (0.001)	-0.000 (0.000)	0.000 (0.000)	0.002*** (0.000)	0.006*** (0.001)
Constant	-0.056*** (0.005)	-0.004* (0.002)	0.086*** (0.001)	0.262*** (0.003)	0.857*** (0.007)
Observations	389,910	389,910	389,910	389,910	389,910
R-squared	0.077	0.076	0.091	0.128	0.121
<i>Panel E. Interest on debt</i>					
Δ Full time employment (t-1)	-0.045*** (0.001)	-0.019*** (0.000)	-0.020*** (0.000)	-0.042*** (0.001)	-0.139*** (0.002)
Interest on debt (t-1)	-0.007*** (0.001)	-0.003*** (0.000)	-0.001*** (0.000)	0.003*** (0.000)	0.011*** (0.001)
Constant	-0.056*** (0.006)	-0.003 (0.002)	0.088*** (0.001)	0.259*** (0.003)	0.813*** (0.008)
Observations	329,195	329,195	329,195	329,195	329,195
R-squared	0.077	0.077	0.090	0.123	0.116
<i>Panel F. Current assets / Turnover</i>					
Δ Full time employment (t-1)	-0.046*** (0.001)	-0.019*** (0.000)	-0.019*** (0.000)	-0.042*** (0.001)	-0.147*** (0.002)
Liquidity ratio (% of turnover) (t-1)	0.004*** (0.001)	0.000 (0.000)	0.001*** (0.000)	0.002*** (0.000)	-0.004*** (0.001)
Constant	-0.054*** (0.005)	-0.003 (0.002)	0.087*** (0.001)	0.263*** (0.003)	0.857*** (0.007)
Observations	390,418	390,418	390,418	390,418	390,418
R-squared	0.078	0.077	0.091	0.128	0.121

Significance:

*p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: All the regressions presented in this table control for sociodemographic characteristics, industry-fix effects, and year-fix effects.

Table C11: Determinants of job growth: Alternative economic/financial variables

	Δ Full time employment				
	$Q_T = 0.10$ (1)	$Q_T = 0.10$ (2)	$Q_T = 0.50$ (3)	$Q_T = 0.75$ (4)	$Q_T = 0.90$ (5)
<i>Panel G. Current assets / Long-run debt</i>					
Full time employment (t-1)	-0.047*** (0.001)	-0.019*** (0.000)	-0.020*** (0.000)	-0.041*** (0.001)	-0.144*** (0.002)
Liquidity ratio (% of debt) (t-1)	0.002*** (0.001)	0.001*** (0.000)	0.000 (0.000)	-0.001*** (0.000)	-0.007*** (0.001)
Constant	-0.053*** (0.006)	-0.003 (0.002)	0.088*** (0.001)	0.260*** (0.003)	0.840*** (0.008)
Observations	366,870	366,870	366,870	366,870	366,870
R-squared	0.078	0.077	0.090	0.126	0.119
<i>Panel H. Total current assets / Short-run debt</i>					
Δ Full time employment (t-1)	-0.046*** (0.001)	-0.019*** (0.000)	-0.019*** (0.000)	-0.042*** (0.001)	-0.148*** (0.002)
Liquidity ratio (Current assets/Debt) (t-1)	0.006*** (0.001)	0.002*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	-0.006*** (0.001)
Constant	-0.054*** (0.005)	-0.003 (0.002)	0.086*** (0.001)	0.263*** (0.003)	0.858*** (0.007)
Observations	390,418	390,418	390,418	390,418	390,418
R-squared	0.078	0.077	0.091	0.128	0.121

Significance:

*p<0.1; **p<0.05; ***p<0.01

Source: DADS, BIC, MMO, 2007 – 17.

Note: All the regressions presented in this table control for sociodemographic characteristics, industry-fix effects, and year-fix effects.

Table D1: Count of firms by year and source

	DADS POSTES				En considérant seulement les siren présents au moins une fois dans les bic-rn / bic-is	En considérant seulement les siren présents au moins un jour un effectif > 49	N. de siren distincts	BIC IS Nombre de siren distincts	LIFI Liaison		LIFI Entreprise		Full sample	
	Nombre de siren distincts (tous les postes)	En considérant seulement les siren présents au moins une fois dans les bic-rn / bic-is	Nb siraval distincts	Nb id.ul fille distincts					Nb distincts	Nb sirlifi distincts	Nb id.ul distincts	Nb siren non cylindré	Nb siren cylindré	
2002	1,749,694	705,487	66,012	692,823	692,823	692,823	156,516	193,894	198,118	13,217	22,597	13,217	22,597	
2003	1,752,778	745,568	68,239	709,682	709,682	709,682	168,004	198,118	213,078	47,026	22,597	47,026	22,597	
2004	1,675,488	732,326	67,958	727,009	727,009	727,009	189,742	242,399	242,399	49,829	22,597	49,829	22,597	
2005	1,802,442	804,670	70,889	747,855	747,855	747,855	199,512	254,716	254,716	54,205	22,597	54,205	22,597	
2006	1,807,182	838,262	71,839	771,084	771,084	771,084	206,108	261,869	261,869	56,539	22,597	56,539	22,597	
2007	1,848,875	868,428	72,438	791,266	791,266	791,266	205,716	263,955	263,955	57,491	22,597	57,491	22,597	
2008	1,855,152	897,496	72,811	802,092	802,092	802,092	207,985	268,417	268,417	57,786	22,597	57,786	22,597	
2009	5,442,637	931,355	73,937	813,940	813,940	813,940	227,134	290,328	290,328	56,993	22,597	56,993	22,597	
2010	6,232,124	948,774	73,490	835,121	835,121	835,121	251,195	323,040	323,040	56,863	22,597	56,863	22,597	
2011	6,185,247	976,865	73,241	858,494	858,494	858,494	358,597	485,590	485,590	58,639	22,597	58,639	22,597	
2012	6,155,415	1,007,093	73,451	872,412	872,412	872,412	369,065	507,101	507,101	59,879	22,597	59,879	22,597	
2013	6,100,201	1,039,156	73,266	886,148	886,148	886,148	0	370,973	511,437	60,294	22,597	60,294	22,597	
2014	6,054,612	1,075,124	73,114	904,607	904,607	904,607	0	503,201	698,724	60,224	22,597	60,224	22,597	
2015	5,994,438	1,118,281	72,799	926,621	926,621	926,621	0	513,224	695,490	55,943	22,597	55,943	22,597	
2016	5,967,833	1,153,288	72,089	2,615,592	2,615,592	2,615,592	0	542,366	734,588	55,968	22,597	55,968	22,597	
2017	6,016,620	1,209,630	72,492	2,816,173	2,816,173	2,816,173	0	525,556		45,312	22,597	45,312	22,597	
2018	6,064,647	1,222,675	71,260											
2019	6,079,573	1,183,681	69,362											
Total (2003-2018)	70,955,691	15,568,991	1,153,313	10,412,533	10,412,533	10,412,533	4,994,894	5,948,850	5,948,850	846,208	361,552	846,208	361,552	
Total/Année	4,730,379	973,062	76,888	867,711	867,711	867,711	332,993	396,590	396,590	56,413.87	24,103.47	56,413.87	24,103.47	

Significances:

Source: DADS, BIC, MMO, 2007 – 17.

Note:

*p<0.1; **p<0.05; ***p<0.01