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Gazelles in France

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Abstract

Renewed interest in Schumpeter's creative destruction has been prompting a focus on high-growth firms, which Birch dubbed "gazelles". Among SMEs that employed between 20 and 250 workers in 1993 and were still operating in 2003, the top 5% in terms of growth in jobs – the companies this paper terms "gazelles" – increased their employee numbers fivefold in ten years and created as many jobs as the 50% that took on workers at a more moderate pace (while the remaining 45% lost jobs). The gazelles' growth was uneven, with half of their decade-long increase concentrated in a single year. Gazelles defined on the basis of growth between 1993 and 1998 created no more jobs over the succeeding period, between 1998 and 2003.

External growth, including many mergers and acquisitions, accounted for much of the gazelles' expansion, with such firms being more likely to belong to a group than other similarly sized SMEs. Between 1998 and 2001 – a period of strong growth – external expansion accounted for half the gazelles' total growth, and more for those affiliated with a group.

Gazelles are to be found in all industries, even those in relative decline. Gazelles in sluggish-growth industries expand mainly by external growth, which seems to correspond to a process of concentration, possibly defensive.

Keywords: Growth, firms

Les gazelles in France

Résumé

Le regain d'intérêt porté au thème de la destruction créatrice schumpétérienne conduit à mettre l'accent sur les entreprises à forte croissance, appelées « gazelles » par Birch. Parmi les PME de 20 à 250 salariés en 1993 et existant encore en 2003, les 5% connaissant le plus fort taux de croissance des effectifs salariés - définies ici comme des gazelles - quintuplent leurs effectifs en 10 ans et gagnent autant d'emplois que les 50% gagnant de l'emploi avec un taux plus modéré (les 45% restant perdent de l'emploi). La croissance des gazelles est irrégulière : la moitié de leur gain en emploi sur 10 ans est concentrée sur une seule année. Les gazelles définies sur la base de leur croissance entre 1993 et 1998 ne gagnent plus d'emplois sur la période suivante, entre 1998 et 2003.

Une bonne partie de la croissance des gazelles relève de la croissance externe, avec de nombreuses restructurations intragroupe : les gazelles appartiennent plus souvent à un groupe que les PME de taille équivalente. Sur la période 1998 - 2001, période de forte croissance, la moitié de la croissance des gazelles - plus quand elles appartiennent à un groupe - relève de la croissance externe.

On trouve des gazelles dans tous les secteurs, y compris ceux en déclin relatif. Dans ce dernier cas, il s'agit surtout de croissance externe, les gazelles semblant relever d'un processus de concentration, éventuellement défensif.

Mots-clés : Croissance, entreprises

Classification JEL: L25 - L11

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Introduction

In much of the literature on how Europe may be lagging behind the United States (Acemoglu *et al.*, 2003; Sapir, 2004), the theme of Schumpeterian creative destruction features prominently, the process being seen as accentuated by the presumption that Europe has moved on from imitation-driven growth to an expansion fuelled by the innovation needed to remain at the cutting edge of technology. Business demographics and growth would seem to show, however, that renewal of the production network is falling short of the mark: Europe is hampered by "excessive stability in the positions of the dominant firms", as Cohen and Lorenzi (2000) put it after noting that the largest firms included few ones. Reciprocally, looking at the starting point, Barstelman *et al.* (2003) showed that Europe's rates of business creation and destruction were comparable to those of the United States, but that post-entry performance was then clearly more sluggish. These studies and findings prompt interest in the high-growth businesses that David Birch termed "gazelles" (Birch, 2002).

Studying the growth of firms prompts numerous methodological questions:

- What is the most relevant unit of observation?

  In most cases a business can be identified by a registration number, which in France is known as the SIREN number, which in fact designates a legal entity. This raises two difficulties:

    o The level involved is not necessarily the one most relevant to growth issues: in the case of a firm that splits in two to constitute a group, for example, it would be better to monitor the group as a whole. In addition, a large number of group-affiliated SMEs are affected by intra-group restructuring (Picart, 2004)

    o Even if unaffiliated, many businesses change their SIREN numbers.

  The statistical system does not allow for monitoring small groups, but the findings can be checked against membership or non-membership of a group. In most of this working paper, the entity of observation will be at SIREN level. Nevertheless, an ongoing study on grouped employee mobility is used to test the sensitivity of the results obtained, over a given sub-period, to the factoring in of changes in SIREN numbers and restructuring.

- Should the focus be on total growth or restricted to internal growth?

  This distinction is often disregarded, and yet it is crucial to any attempt to assess macroeconomic effects: internal, or organic, growth alone is to be found in the aggregate (Davidsson *et al.*, 2005). In the aforementioned OECD study (Schreyer, 2000), this distinction was possible only in respect of Swedish data, and the results were spectacular: only one-third of the growth of Swedish gazelles resulted from internal growth. Here, internal growth could be set apart from external growth by reviewing grouped flows of employees over a sub-period of the study.

- What is the appropriate size criterion?

- According to what growth criterion should gazelles be selected?

These last two issues are explored in Part I of the working paper, which defines gazelles on the basis of legal entities alone; Part II factors in restructuring in order to separate internal growth from external growth. The paper ends with a sectoral and financial profile of gazelles and highlights a correlation between sluggish growth in an

industry and the proportion of gazelles' total growth that is attributable to external growth.

I - Defining gazelles on the basis of employment trends of legal entities

Legal entities identified by their SIREN number are the only ones that can be monitored over a sufficiently long time frame to define gazelles. To reiterate that this is not necessarily the most relevant level, and that a business can survive under its name or report its employees under another legal entity, in most cases the term "SIREN entity" will be used, rather than "firm", when changes are taking place.

I.1 Selecting gazelles

- What is the appropriate size criterion?

  Most studies choose either employment or turnover. The European Commission uses a multidimensional criterion that combines employment, turnover and total assets (Boissonade, 2003). Here, the preferred criterion is dependent employment, because the focus is on the objective of government – jobs – rather than on that of entrepreneurs, as well as for data-related considerations, since the distinction between internal and external growth can be approached (in an as yet experimental manner) only through sources dealing with dependent employment (annual reporting of company data, or DADS). However, this criterion may fail to identify gazelles that make extensive use of subcontracting or temporary employment, although such practices are more typical of large corporations than of SMEs.

- How should growth be measured? Should gazelles be selected on the basis of absolute performance (having a growth rate in excess of a given threshold) or relative performance (being in the top X%)?

This last point is the subject of the box below.

Box: The growth of firms, Gibrat's law and selecting gazelles

Gibrat's law

Growth can be measured in either relative or absolute terms. While aggregate impact considerations may militate in favour of absolute growth, the very notion of gazelles and its association with SMEs lead to a focus on relative growth: the performance of an SME that goes from 50 to 150 employees is more remarkable than that of an SME whose headcount grows from 250 to 350. An OECD study (Schreyer, 2000) deems that relative growth confers an unfair advantage on small firms and absolute growth on large ones; an indicator is used that combines both dimensions. The drawback of that solution is that the findings cannot be interpreted as readily. If a choice must be made between these two criteria, relative growth would seem preferable, especially insofar as this does not necessarily give small firms an edge, at least if Gibrat's law holds true.

Empirical observation of the distribution of firm size led Robert Gibrat, in 1931, to formulate a law of proportional growth which can be stated simply as follows: $x_t - x_{t-1} = \varepsilon_t x_{t-1}$, where x is firm size and ε is distributed normally (Sutton, 1997). If values for ε_t are small and mutually independent, then $\log x_t = \log x_0 + \Sigma \varepsilon_k$ and the distribution of firm size obeys a log-normal law. This law has spawned a great deal of empirical research, and opinions still diverge as to the extent of its validity. In particular, it needs to be amended to factor in entries and exits, and it would not appear to apply to the youngest firms. A test on all firms having employees in 2003 rejected the hypothesised log-normality of firm size distribution. This test would probably be more relevant if performed by industry than for all firms combined, but our interest here is not so much the distribution law as the independence of growth and size, which is a weak version of

Gibrat's law, requiring neither the specification of the ε_t law nor the hypothesis of independence between the values of ε_t. If this weak version is borne out, then a firm's growth rate is a good selection criterion for gazelles, insofar as it does not give small firms an edge over large ones.

Selecting gazelles

In practice, gazelles will be selected on the basis not of an absolute performance criterion – growth rate – but a relative one: within each size bracket, the top 5% of perennial firms (i.e. those in business at the beginning and at the end of the reference period). Two performance criteria are used:

1. Total growth between year n and year n+k

    a. **Long-distance gazelles** (k = 10)

    b. **Sprint gazelles** (k = 5)

    Other values are sometimes used for k, as needed.

2. Regularity of good performance

Here the aim is to incorporate the idea of regularity that is present in the selection criterion of Birch, for whom gazelles are firms that grow by at least 20% in each of four consecutive years. Birch defines an absolute criterion which when applied to France yields only a very small number of businesses. This criterion will be tailored to the case of France, and to the idea of relative performance, to define "**Birch-type gazelles**" (see below).

This choice of relative performance offers the advantage of uniformity in terms of size, business climate (n) and time frame (k). With absolute performance, a growth threshold would have to be chosen and justified for each value of k. But in some cases relative performance can offer a number of drawbacks: if firms in a given size bracket displayed special vitality, then some dynamic businesses in that bracket would be rejected while other, less dynamic firms in other brackets would be included. But this risk is more theoretical than real insofar as the threshold for selecting long-distance gazelles is between 10 and 250 employees, independent of size – which can be seen as a local confirmation of Gibrat's law (Figure 2).

A number of precautions

The definition of gazelle used herein is based on an observed outcome, i.e. the trend in employee numbers over a specified time frame: firms are designated as gazelles *ex post facto*. The concept of gazelle used herein cannot therefore be used to target firms that have not yet experienced their growth period. To our knowledge, defining gazelles before the fact would pose an insoluble problem.

By definition, a firm can be considered a gazelle only in respect of a specified time frame. Being a gazelle cannot be a permanent feature of the firm under review. First, the empirical research presented in this study shows that gazelles can run out of steam. Second, it is natural to run out of steam, since no firm can grow indefinitely.

The number of gazelles selected is wholly determined by the reference population – perennial firms – and by the selected threshold for the relative performance criterion. Mechanically, to select the top 10% would yield twice as many gazelles as the 5% threshold used in this study.

I.2 Firm growth between 1993 and 2003: 5% of perennial firms were responsible for 50% of gross job gains

The study covers firms that are taxed under the standard real profit (BRN) or simplified (RSI) company tax regime, except for agricultural firms (NES16 = 'A'), those administered by government (NES16 = 'R') and temporary/loaned employment firms (NES114 = 'N32'). This paragraph covers all firms in this field, whereas the following paragraphs will be restricted to BNR firms[1] with between 20 and 250 employees at the start of the reference period.

Dependent employment within this cohort increased from 11.9 million jobs in 1993 to 14.3 million in 2003 – a net creation of 2.4 million jobs (Table 1). This job creation was the net result of:

1. A net excess of 1.1 million job gains from new businesses (jobs in 2003 at firms created after 1993) over job losses from firms that closed (jobs in 1993 at firms that subsequently disappeared);

2. A net deficit of 200 000 jobs between job gains at firms that had 0 employees in 1993 and job losses at firms that had 0 employees in 2003;

3. A gain of 1.5 million jobs at perennial firms that had employees in both 1993 and 2003. Of these, firms that had job gains increased their employment by 2.8 million jobs.

Table 1: Breakdown of employment trends between 1993 and 2003

	Nb of firms	Jobs in 1993	Jobs in 2003	Net change
Total	1 589 714	11 896 954	14 262 007	2 365 053
Firms with job gains	187 092	3 559 589	6 354 585	2 794 996
Firms with job losses	123 052	3 790 391	2 452 824	-1 337 567
Firms with stable number of jobs	93 674	300 217	300 217	0
Existing firms with 0 jobs in 1993	57 787	0	445 797	445 797
Existing firms with 0 jobs in 2003	76 982	654 806	0	-654 806
Firms created	648 553		4 708 584	4 708 584
Firms disappeared	402 574	3 591 951		-3 591 951

Source: SUSE (BRN and RSI). Firms included only if they had at least one employee in 1993 and/or 2003.
Interpretation: 187 092 perennial firms added a net 2 794 996 jobs between 1993, when they had 3 559 589 employees, and 2003, when they had 6 354 585.

Of the 404 000 perennial firms (SIREN entities), and for each size bracket[2], the top 5% in terms of the employee growth rate are selected as gazelles – long-distance gazelles as defined in the box. Over a ten-year period, these 20 000 gazelles added 1.43 million jobs – as many, and even slightly more, than the 185 000 other businesses that expanded their employee numbers (see Table 2 below for a breakdown by size bracket). This finding is consistent with that of the OECD (Schreyer, 2000) with the same definition of gazelles over a number of different countries[3].

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[1] The following paragraphs refer to a panel, and by limiting the scope to BRN firms the sizes of the files used can be reduced substantially without significant loss if the sample is limited to firms with at least 20 employees.

[2] Thin brackets, except for large sized firms, for which brackets have to be expanded to keep a sufficient number of firms. Example brackets: 15 to 19 employees, 80 to 90, 700 to 1 000. The lower limits of the brackets lie along the horizontal axis of Figure 1.

[3] For France, the OECD study covered 10 000 perennial industrial firms over the period 1985 - 1994.

Figure 1: Gazelles' share of gross job gains
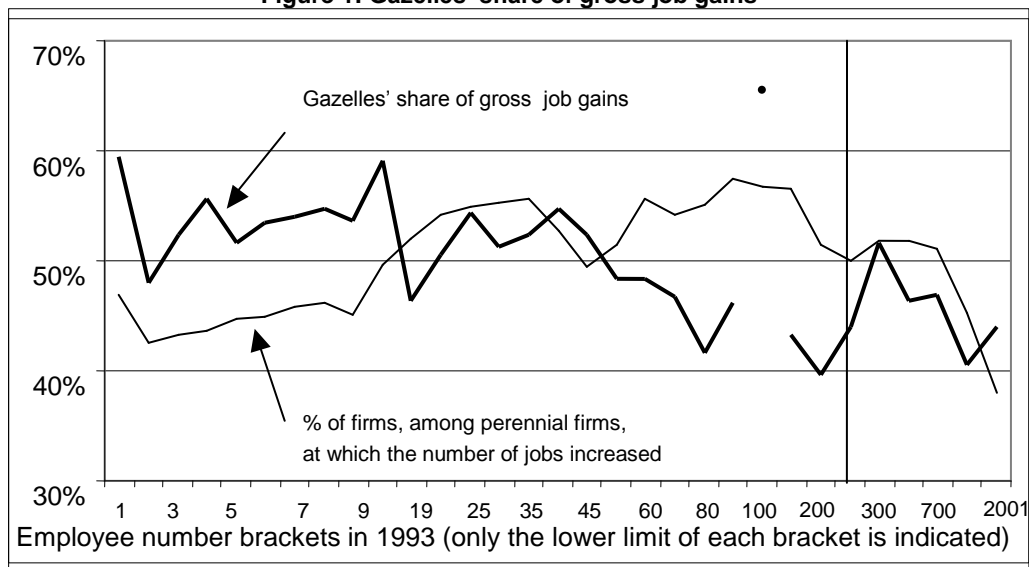
* aberration stemming from the consolidation by a large industrial group of 83 000 of its employees in one firm (legal entity) which had employed only 136 in 1993.
Interpretation: 50% of the firms that had between 250 and 300 employees in 1993 (the horizontal access shows only the lower limit of each size bracket) added jobs between 1993 and 2003. The gazelles in that bracket (5% of the firms, 5/50=10% of growing firms) accounted for 44% of gross job gains.

The gazelles' share of gross job gains was just over half for firms with fewer than 50 employees in 1993 and just under that thereafter (Figure 1). Jobs at all gazelles combined increased five-and-a-half-fold in ten years, with average growth running higher at small-sized gazelles (Figure 2). Even among firms with over 2 000 employees, which in the aggregate lost jobs, gazelles grew sharply, tripling their work force in ten years. This example shows that the temptation to seek a correlation between gazelles' growth and aggregate growth, which for large firms was negative, should be resisted.

Figure 2 : Growth in employee numbers (employees 2003/ employees 1993) by size bracket
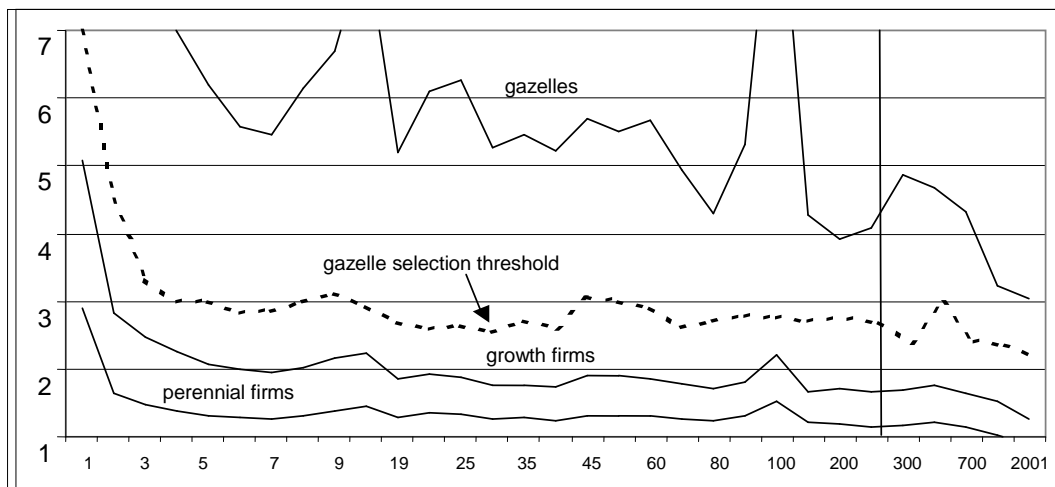
Interpretation: Perennial firms that in 1993 had between 250 and 300 employees (the horizontal axis indicating the lower limit of each size bracket for number of employees), increased their work force by 15% between 1993 and 2003. Among these firms, those that grew increased their work force by 67%, whereas the number of jobs at the gazelles quadrupled. In this size bracket, gazelles are firms whose work force increased by a factor of at least 2.7.

The curve showing the average growth rate for gazelles is far more jagged than the curve indicating the threshold above which firms are selected as gazelles, which signals the presence of sharp peaks and troughs. The spectacular peak for the 100-150 employee bracket is the one already shown in Figure 1: the consolidation by a large industrial corporation of 83 000 employees into a firm that had had only 136 employees in 1993. There are other peaks as well, which show the presence among gazelles of extensive restructuring operations within large corporate groups.

I.3 Focusing on SMEs: setting parameters

Here, SMEs are defined in terms of number of employees: in 2003, 87 000 firms each having between 20 and 250 employees provided a total of 4.5 million jobs. Limiting the scope to SMEs in order to focus on dynamics entails specifying the year in which the criterion is applied. As a result, only half of the 74 000 SMEs in 1993 were still SMEs in 2003 (Table 2). A vast majority of the others were no longer in existence as legal entities, although they might still have been operating as economic entities under another SIREN number or as production units if they had merged with another company. A minority – just under 1 500 – had crossed the threshold of 250 employees. Gazelles that were initially SMEs – hereinafter the term "gazelle" will be reserved for such SMEs – accounted for only part of the firms in the top half-decile in terms of growth rates and were responsible for 40% of the latter's job gains (580 000 out of 1 430 000). Among these gazelles, the sharpest gains (432 000) were achieved by firms that broke through the 250-employee threshold, and likewise, most of the job gains by the 1 500 SMEs that crossed that threshold were attributable to gazelles. Over the ten-year time frame, only a very small number of firms – 159 – managed to break through both the 20- and the 250-employee threshold, increasing their employee numbers by more than a hundredfold. Lastly, while a majority of job creations would seem attributable to new businesses (SIREN entities) that had not existed in 1993 (but that provided 5.1 million jobs in 2003), many of these new SIREN entities, and virtually all of the large ones, were simply the result of changes in existing SIREN numbers by existing businesses, which would seem to confirm the similarity in the number of firms non-existent in 1993 but operating in 2003 and those operating in 1993 but non-existent in 2003 [squares (A,D) and (D,A) in Table 2].

Other analytical research into growth takes an approach based on turnover. The correlation between these two criteria and gazelle selection on the basis of turnover are presented in Annex 1.

Table 2: Firm (SIREN entity) transition matrix
by size bracket between 1993 and 2003

In 1993:	In 2003:	A	B	C	D	Total
A Non-existent or 0 employees	Number of firms		673 859	31 034	1 447	706 340
	Employees 2003		2 314 633	1 468 806	1 370 942	5 154 381
B Between 1 and 19 employees	Number of firms	450 140	336 499	17 699	159	804 497
	Employees 1993	1 478 318	1 434 301	199 662	1 266	3 113 547
	Employees 2003	0	1 618 347	614 087	149 472	2 381 906
	Increase excluding gazelles		337 812	116 359	0	454 171
	Increase by gazelles		88 840	298 066	148 206	535 112
C 20 to 250 employees	Number of firms	27 911	7 519	37 503	1 468	74 401
	Employees 1993	1 414 540	242 806	1 948 761	207 230	3 813 337
	Employees 2003	0	88 030	2 318 119	743 622	3 149 771
	Increase excluding gazelles			426 667	106 362	533 029
	Increase by gazelles			152 001	430 030	582 031
D Over 250 employees	Number of firms	1 505	94	521	2 356	4 476
	Employees 1993	1 353 899	90 875	303 307	3 221 989	4 970 070
	Employees 2003	0	586	79 710	3 495 653	3 575 949
	Increase excluding gazelles				378 110	378 110
	Increase by gazelles				312 543	312 543
Total	Number of firms	479 556	1 017 971	86 757	5 430	1 589 714
	Employees 1993	4 246 757	1 767 982	2 451 730	3 430 485	11 896 954
	Employees 2003	0	4 021 596	4 480 722	5 759 689	14 262 007
	Increase excluding gazelles	0	337 812	543 026	484 472	1 365 310
	Increase by gazelles	0	88 840	450 067	890 779	1 429 686

* : including the 83 000 job gains by a single SIREN entity. This entity will be excluded from subsequent analysis.

Interpretation (see also the commentary on the above table in the body of the paper): 1 468 firms that had between 20 and 250 employees in 1993 had over 250 employees in 2003 (line C, column D, the definitions of the columns, which refer to the situation in 2003, being the same as those of the lines, which refer to the situation in 1993). These firms had a total of 207 230 employees in 1993 and 743 622 in 2003. By definition, all of these were growth firms (which is not the case for all squares). Among them, gazelles created 430 030 jobs and the other firms 106 362.

I.4 The gazelles' 10-year growth tends to be concentrated over a small number of years

The gazelles' greater job gains, as compared to other growing perennial firms, are due solely to a very high rate of job creation (18% as opposed to 7%), while the job destruction rates[4] are virtually identical (3%) (Table 3). Analysis over a lengthy time frame can detect years in which firms increased their employee numbers the most. During the year in which the most jobs were created, gazelles recorded half of their total gross job creations (versus 45% for other growth firms).

Table 3: Breakdown of growth of perennial SMEs between 1993 and 2003

	Shrinking SMEs	Growing SMEs excluding gazelles	Gazelles	Total
Number of firms	20 074	24 337	2 347	46 758
Employees 1993 (A)	1 050 104	1 236 108	123 339	2 409 551
Employees 2003 (B)	685 726	1 767 394	632 246	3 085 366
Change: A - B	-364 378	531 286	508 907	675 815
Cumulative gross gains (C)	340 342	977 844	601 868	1 920 054
Cumulative gross losses (D)	703 096	447 449	92 985	1 243 530
Cumulative number of employees (E)	8 930 083	14 721 991	3 261 625	26 913 699
Annual gain rate: C/E	3.8%	6.6%	18.5%	7.1%
Annual loss rate : D/E	7.9%	3.0%	2.9%	4.6%
Gains in year of greatest gains	197 193	435 966	299 530	932 689
Gains in the second year	79 990	218 121	118 633	416 744
Gains in the third year	38 380	135 722	67 068	241 170

Scope: Firms having between 20 and 250 employees in 1993 and still having employees in 2003

Interpretation: The gazelles had aggregate employees of 123 339 in 1993 and 632 246 in 2003, for total job gains of 508 907. For each firm, the net gain is the cumulative result of years when employment increased – 601 868 job gains – and years when employment decreased – 92 985 job losses. These losses and gains should be seen against aggregate employees over the period, i.e. 3 261 625, so as to compute rates of average annual job gains (18.5%) and losses (2.9%). The gazelles' aggregate job gains during each one's respective year of sharpest growth (which varies from firm to firm) totalled 299 530. Aggregate job creations in each gazelle's second-highest growth year totalled 118 633, and 67 068 in their third-highest years.

During their year of sharpest growth, gazelles grew by an (unweighted) average of 100%, with median growth of 55%, suggesting that some of the values for these growth rates were very high (see Table 4). In one-third of the cases, the two peak growth years were consecutive, although there was no significant correlation between which rate of these two rates was higher and which one came first.

Table 4: Mean and median growth rates of perennial SMEs between 1993 and 2003 during their years of highest growth

	Nb of firms	Year of highest growth		Year of second-highest growth	
		Mean rate	Median rate	Mean rate	Median rate
Shrinking perennials	20 074	4%	0%	1%	0%
Growing perennials	24 351	20%	15%	9%	7%
Gazelles	2 348	101%	55%	31%	27%

Interpretation: During their year of highest growth in employee numbers, the mean growth rate for gazelles was 101%, and the median growth rate was 55%. During their year of second-highest growth, their mean growth rate was 31%.

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[4] During some of these 10 years the gazelles, which are defined here in terms of net growth over a 10-year time frame, may lose jobs.

In 55% of cases, the two peak years were no more than one year apart. Because of this irregular and relatively concentrated growth pattern, it would be conceivable to identify gazelles on a sliding basis over four-to-five-year time frames.

Looking at gazelles over a long period of time provides a clearer understanding of how they grow. In particular, it emerges that for a large majority of gazelles, the growth takes place over a relatively limited time frame. Selecting gazelles over a shorter period would be more consistent with this statistical finding, as well as making it possible to examine how the gazelles selected in this way evolved over the rest of the period under review.

I.5 Examination of gazelles selected over a shorter time frame confirms the irregularity of their growth pattern

The smallest SMEs have the highest short-term growth rates, whereas intermediate-sized firms exhibit the best performance over the medium term (see Figure 3).

Figure 3: Growth rates by firm size over different time frames
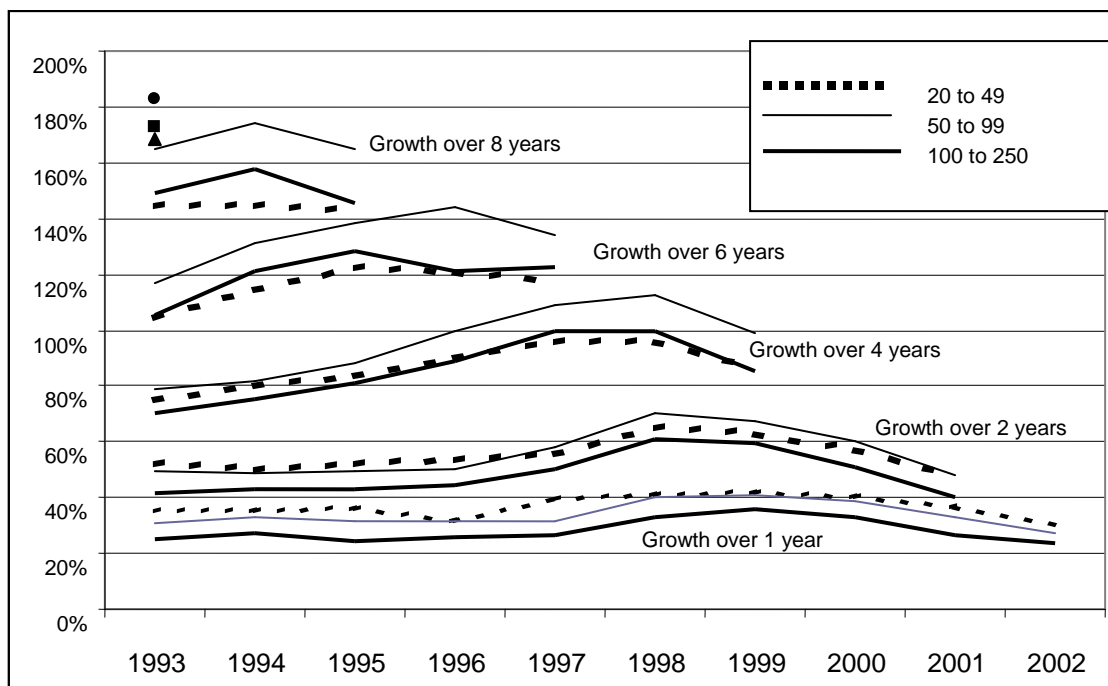
Interpretation: The growth rate over one year of the top half-decile of SMEs with 20 to 49 employees was 35% in 1993 and 42% in 1999. Over six years, it was 105% in 1993.

The fact that the growth-rate hierarchy is reversed, depending on the chosen time frame, would suggest that the growth of the smallest firms (those with 20 to 50 employees) is irregular, either because the jobs created are more fragile, or because of the greater impact of measurement errors for small-scale SIREN entities.

This instability emerges clearly when successive growth-rate rankings are compared: the gazelles of any given year are over-represented among perennial firms that destroy the greatest number of jobs during the following year (Table 5). The same pattern can be seen, albeit to a lesser extent, among SIREN entities having between 50 and 250 employees.

**Table 5: Outcome in 2001 for SMEs having 20 to 49 employees
by growth rate in 1999**

	Nb of firms	0 employees	Bottom 5%	Inter-mediate	Top 5%
Bottom 5% in terms of growth	2 742	15%	9%	58%	18%
Intermediate firms	49 924	4%	3%	89%	4%
Top 5% in terms of growth	2 762	4%	14%	73%	10%

Interpretation: Of the 55 428 SIREN entities having 20 to 49 employees in 1999 and still in existence in 2000, the 2 762 fastest-growing firms, i.e. the gazelles, ended up as follows between 2000 and 2001: 4% of them no longer existed or had no employees in 2001, 14% had growth rates placing them in the bottom 5% for businesses in their size category and 10% had growth rates that made them gazelles for 2000/2001.

This instability of growth is actually found across the board. An initial glimpse of this is provided by Figure 3. If SIREN entities in the top half-decile for any given period were still in the top half-decile for the succeeding period, the differential between the curves measuring growth over 1 year (or 2 or 4 years) and those measuring growth over two years (or 4 or 8 years) would be higher than the values observed.

To elaborate on this point, Table 6 presents, for 1995, the theoretical growth rate of the top half-decile over a given time frame (of 2n years) using growth rates for the first sub-period (of n years), assuming that the firms identified as gazelles over that period, i.e. 1995 to 1995+n, experienced the same growth rate over the second sub-period, i.e. between 1995+n and 1995+2n, as gazelles identified over that second sub-period.

**Table 6: Comparison of observed versus simulated growth rates, assuming sustained
growth over the time frame used for gazelle selection**

	GR observed over 1995 + 2n	Calculated GR
1 to 2 years	50%	75%
2 to 4 years	90%	130%
4 and 8 years	150%	250%

Interpretation: SIREN entities in the top half-decile grew by at least 50% between 1995 and 1997. Applying the growth rate of the top half-decile between 1996 and 1997 to SIREN entities in the top half-decile between 1995 and 1996 would have resulted in 75% growth over 2 years.

The differential between observed and calculated growth rates continues over longer time frames and thus does not stem merely from short-term instability arising from any measuring errors.

I.6 The performance of gazelles is relatively insensitive to general economic conditions

Figure 4: Gazelle growth and general economic conditions
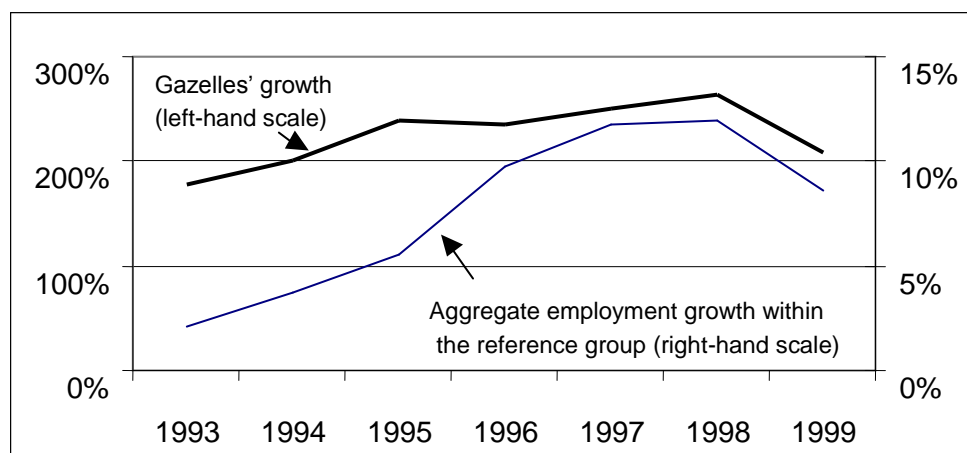
Interpretation: Between 1993 and 1997 (1993 values on the graph's horizontal axis), the fastest-growing 5% of SMEs expanded their employee numbers by 177% whereas total employment within the reference group rose by 2%. Between 1998 and 2002, the corresponding rates were 264% and 12% respectively.

Fluctuations in the average growth rate of the fastest-growing SMEs are significantly less sharp than fluctuations in total employment (Figure 4). Insofar as the growth of gazelles is due to brisk expansion both internally and externally (see below), there are two possible explanations for this: as regards internal growth, the innovations that carry some firms to very high levels of performance may well make them less sensitive to general economic conditions; and with respect to external growth, corporate buyouts and intra-group restructuring operations can also take place when the economy is weak.

I.7 Few gazelles, as defined by Birch, in France

There are only 376 SIREN SMEs that have experienced annual growth in employee numbers of at least 20% during each of four consecutive years. To compare this very low number of gazelles to Birch's findings in respect of American data, it would be better to use the same criterion as Birch, i.e. turnover. Replacing the size criterion (20 to 250 employees) by one of turnover (€2 to 50 million), 169 000 SIREN units were pre-selected, including 1 737 gazelles, or 1% of the population. Each year, between 0.3% and 0.5% of SMEs meet this criterion for sharp and steady growth in turnover (Table 7)[5]. Using American data, Birch found that gazelles accounted for 3% of SMEs in 1990. To obtain a similar proportion of gazelles in France, the qualifying annual growth threshold would have to be lowered to a rate of between 5 and 10% (Table 7). Such variations cannot be interpreted as stemming solely from differential growth rates between the two economies: first, the years 1990 to 1994 were not a very high-growth period in the United States; and second, if the proportion of gazelles fluctuated

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[5] The ratios have the same order of magnitude if one moves even closer to Birch's definition by lowering the turnover threshold to €200 000.

with growth, it was in a ratio of less than 1:2 with periods as contrasting as 1993-1997 or 1999-2003 and 1997-2001. This difference must be approached with caution, however, for two reasons. First, it is always tricky to compare corporate data from different countries – what one country calls an enterprise may correspond to a group in another. Second, Birch's results are in dispute, *inter alia* because he derived them from a private data base. To our knowledge, however, Birch's estimates are the only ones to have been catalogued in this area.

Table 7: Proportion of gazelles, depending on the selected turnover growth threshold

Gazelle in	20%	10%	5%	2%
1993	0.28%	1.5%	4.2%	8.4%
1994	0.32%	1.7%	4.8%	9.3%
1995	0.35%	1.8%	4.9%	9.4%
1996	0.43%	2.4%	6.5%	11.9%
1997	0.48%	2.6%	7.1%	13.0%
1998	0.33%	1.9%	5.5%	10.7%
1999	0.26%	1.6%	4.8%	9.5%
At least once	1.03%	4.9%	12.0%	20.0%

Interpretation: 0.28% of SMEs having turnover of between €2m and €50m in 1993 (in 2003 €) recorded nominal turnover growth of at least 20% during each of the following four years. 1.03% of SMEs that had turnover of between €2m and €50m at least once between 1993 and 1999 satisfied this criterion at least once.

This criterion, measured on the basis of either employee numbers or turnover, returns an insufficient number of observations when applied to the situation in France. It does, however, offer the advantage of stressing the importance of sustained growth, which apart from the intrinsic benefit of steady growth, eliminates SIREN entities whose cumulative growth between a given year n and year n+k involves an error of measurement at either end, or a single jump caused by an external growth operation. Since Birch's definition does not lend itself to SIREN entity employment, it was adjusted so as to keep roughly 5% of a cohort. Thus, in respect of a given year n, "Birch-type gazelles" are SIREN entities that are among the top 15% firms in terms of growth between n and n+2 and among the top 20% between n+2 and n+4. This incorporates steady-growth firms while retaining enough flexibility to allow for the irregular growth patterns of French SIREN entities[6].

I.8 Sprint gazelles tend to be long-distance gazelles as well

It is difficult to compare various definitions of gazelles in respect of different time frames: 10 years for long-distance gazelles, 5 years for sprint gazelles and 4 years for Birch-type gazelles. To reduce some of this diversity, sprint gazelles could be defined in respect of a four-year time frame. In that case, a comparison between sprint gazelles and Birch-type gazelles would involve the difference in selection criterion alone: magnitude of growth over 4 years for sprint gazelles and regularity for Birch-type gazelles. Of the 62 000 SIREN SMEs in 1993 that still had employees in 1997, 16% were gazelles under at least one of the three definitions, and only 3% satisfied all three criteria simultaneously.

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[6] In any event, it is not possible to set 1-year growth rates that could return 5% of the population; to do so would entail thresholds of less than 5% for SIREN entities with 20 employees.

Table 8: Breakdown of gazelles by definition

Type	Number	Of which: also qualified as		
		Birch-type	Sprint	Long-distance
Birch-type (B)	7 076		63%	27%
Sprint (S)	7 174	62%		31%
Long-distance (L)	2 384	79%	93%	
B & S	4 434			41%
B & not S	2 642			3%
S & not B	2 740			15%
B & L	2 841		81%	
S & L	1 885	95%		

Interpretation: Of the 62 000 SIREN SMEs in 1993 that still had employees in 1997, 7 076 satisfied the selection criterion for Birch-type gazelles at least once between 1993/1997 and 1999/2003. 63% of those Birch-type gazelles were also sprint gazelles at least once between 1993/1997 and 1999/2003, and 27% were long-distance gazelles in 1993/2003. Only 3% of the 2 642 Birch-type gazelles that were not sprint gazelles were also long-distance gazelles.

Sprint gazelles are more likely also to be long-distance gazelles than Birch-type gazelles (Table 8). This is consistent with the finding that the growth of long-distance gazelles is irregular and concentrated over a short period. However, sprint gazelles are more likely to become long-distance gazelles if they are also Birch-type gazelles (41% versus 15% if not). There is thus a sort of regularity bonus which is robust to control by the growth rate of these sprint gazelles[7].

I.9 Gazelles before and after their high-growth phase

Are gazelles recently created firms? What becomes of them after their high-growth phase?

This last question is a tricky one, since the answer depends on the choice of reference population. After their high-growth phase, gazelles may no longer be SMEs and thus are not necessarily still comparable to a population of SMEs.

Nevertheless, it is already extremely informative to look at trends among gazelles alone. To explore what becomes of gazelles, Table 9 shows, in its initial columns, the trends in employee numbers between 1998 and 2003 of firms identified as gazelles between 1993 and 1998. Between 1998 and 2003, sprint gazelles from 1993 -1998 did not retain all of the jobs they had created. These destructions stemmed from the disappearance of 22% of the gazelles, while a majority of perennial gazelles continued to create jobs, albeit at a lesser pace than during their growth phase (Table 9). The disappearance of certain gazelles does not necessarily mean that the businesses in question failed. What is observed here is only the disappearance of the identifier by which the business is tracked. Absorption into a large group, for example, may explain such disappearances. Further investigations must be made to explore this issue.

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[7] The share of employment growth attributable to internal growth is greater for Birch-type gazelles than for sprint gazelles (see below).

Table 9: Employee number trends of various types of gazelles outside the period in respect of which they are defined as gazelles

	Sprint - 1993		Birch - 1994		Sprint - 1998	
	Nb of firms	Employees (thousand)	Nb of firms	Employees (thousand)	Nb of firms	Employees (thousand)
Employees 1993 (1994*)	2 956	152	2 695	153	2 225	94
Employees 1998	2 956	494	2 695	362	3 166	163
Employees 2003	2 399	475	2 253	381	3 166	660
Increase	1 381	147	1 432	127	1 567	39
Decrease	905	46	723	27	525	15
Disappearances /creations**	557	119	442	81	941	45

* : 1994 for Birch-style gazelles
** : creations (between 1993 and 1998) for 1998 sprint gazelles
Interpretation: The 2 956 sprint gazelles for 1993, selected on the basis of their growth between 1993 and 1998, had a total of 494 000 employees in 1998. 1 381 of them created 147 000 jobs between 1998 and 2003, 905 lost a total of 46 000 jobs, and 557 no longer existed in 2003. The 3 166 sprint gazelles from 1998, selected on the basis of their growth between 1998 and 2003, had 163 000 employees in 1998. 2 225 gazelles were already operating in 1993, and 941 were created between 1993 and 1998.

Using the alternative definition of Birch-style gazelles over the same time frame can yield slightly different results. As suggested by the previous comparison with sprint gazelles, the growth of Birch-style gazelles is less spectacular during the growth phase (over four years instead of five, although the differential cannot be attributable to just one additional year), but the firms are more robust thereafter (Table 9).

The right-hand columns of Table 9 explore the behaviour of businesses prior to becoming gazelles. It is seen that nearly a third of firms identified as being gazelles for the period 1998-2003 had not existed in 1993. Among those that had existed, growth in employee numbers had not been very spectacular during the period prior to high growth (by construction, to some extent, insofar as spectacular growth to beyond 250 employees would make a SIREN entity ineligible for being a 1998 gazelle).

Comparisons with other businesses cannot be limited to SMEs inasmuch as some gazelles for 1993 - 1998 were no longer in the cohort in 1998 and have to be compared with firms of equivalent size. In this paragraph, "1998 gazelles" may therefore be large companies. Comparisons will be limited to performance over the two sub-periods, 1993 - 1998 and 1998 - 2003 for SIREN entities having at least 20 employees in 1998. Relative performance – growth rankings – are determined within each size bracket and for the population as a whole[8]. Table 10 shows performance between 1993 and 1998 as compared with performance between 1998 and 2003. The line "Very high" corresponds to 1993 sprint gazelles and the "Very high" column to those from 1998.

- 40% of 1998 gazelles either did not exist or had fewer than 10 employees in 1993 (versus 21% for the entire sample population).

- 7% of 1998 gazelles had already been gazelles in 1993.

- The fate of 1993 gazelles is a study in contrasts: many of them rank among either the top or the weakest performers for 1998 - 2003, but they are significantly under-represented amongst average-performing firms (26% as opposed to 41%).

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[8] SIREN entities having at least 10 employees in year n and still employing at least 1 person 5 years later were divided into 20 groups on the basis of their size. Five-year growth rankings were calculated within each group.

Table 10: 1998 – 2003 growth ranking cross-tabulated with 1993-1998 growth ranking

		Absent in 2003	Very low 1998-2003	Low 1998-2003	Average 1998-2003	High 1998-2003	Very high 1998-2003	Total
<10 employees in 1993		12.40	6.32	17.61	35.59	20.01	8.08	
		14.78	30.85	21.91	17.95	25.07	39.99	20.70
10 to 19 employees in 1993		16.27	4.29	19.50	38.30	17.81	3.83	
		12.21	13.18	15.28	12.16	14.05	11.96	13.04
>19 in 1993	Very low 1993-1998	42.04	6.72	10.45	21.39	12.44	6.97	
		1.25	0.82	0.32	0.27	0.39	0.86	0.52
	Low 1993-1998	27.99	4.91	16.77	35.09	11.90	3.33	
		16.27	11.70	10.18	8.63	7.27	8.05	10.10
	Average 1993-1998	17.27	3.06	15.06	48.90	13.50	2.22	
		36.21	26.27	32.96	43.39	29.74	19.34	36.42
	High 1993-1998	16.33	3.49	16.45	40.34	19.89	3.50	
		14.49	12.67	15.23	15.14	18.54	12.91	15.41
	Very high 1993-1998	21.77	5.01	17.90	26.38	21.40	7.54	
		4.79	4.52	4.11	2.45	4.94	6.89	3.82
	Total	13514	3300	12945	31938	12862	3253	77812
		17.37	4.24	16.64	41.05	16.53	4.18	100.0

Scope: Firms having at least 20 employees in 1998. This selection criterion explains why the very low-growth firms of 1993 ("Very low" line: the 5% of perennials having lost the most jobs) are so under-represented (0.52% of the population): most of them were beneath the 20-employee threshold in 1998.
Categories (in terms of growth rate percentiles): Very low P1 - P5   Low P6 - P30
*   Average P31 - P70 High P71 - P95   Very high P96 - P100.*
Interpretation: Among gazelles for 1998 - 2003 ("Very high" column), 39.99% had fewer than 10 employees (or were no longer in existence) in 1993; 6.89% of them had already been gazelles in 1993 – 1998; 7.54% of gazelles for 1993 - 1998 were still gazelles in the following period, and 21.77% of them had disappeared by 2003.

I.10 Because their growth is more volatile, young firms are more likely to become gazelles

In 1998, sprint gazelles for 1998 - 2003 had a median age of 9 years, versus 17 years for firms whose growth was average (Figure 5 a). This does not mean that young firms are presumably more likely to become gazelles because there is a substantial selection bias stemming from the volatility of young firms' growth. If non-perennial firms[9] are assigned a growth rate of -100%, it is found that the aggregate performance of young firms is not better but simply more dispersed (Figure 5 b).

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[9] Firms are approached here by their SIREN registration number. The fact that a business no longer appears in the registry does not necessarily mean that it has failed: it may have been merged into another company or transferred.

Figure 5a: Age of SMEs depending on their growth in 1998 - 2003
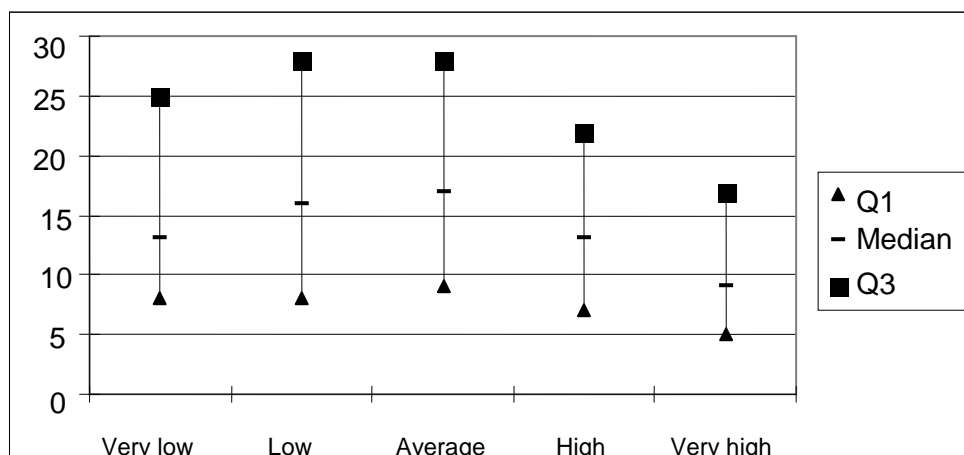
Interpretation: 25% of gazelles (very high growth) were no more than 5 years old, and 25% were at least 17 years old.

Figure 5b: Growth rankings of 1998 SMEs depending on their creation date
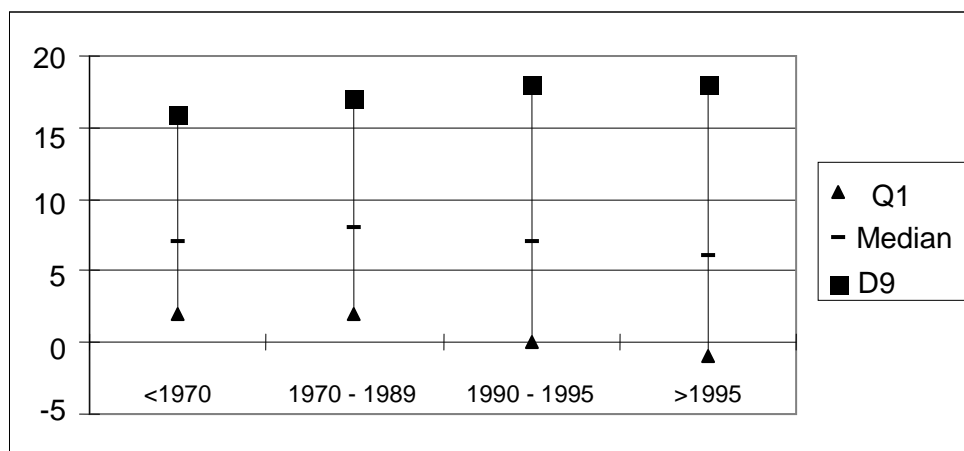
Interpretation: At least 25% of 1998 SMEs created after 1995 were no longer in existence in 2003 (here, the firms destroyed are assigned growth ranks equal to -1), and 10% of them were in the top 10% fastest-growing firms (2 top half-deciles: rank >= 18).

I.11 Gazelles tend to belong to a group

Among the 47 000[10] SMEs from 1993 that were still in existence in 2003, 51% belonged to a group in 2003. Among the fastest-growing 5% of these 47 000 SMEs, i.e. the long-distance gazelles, 78% were part of a group. This comparison is slightly skewed insofar as the 1993 long-distance gazelles were larger in 2003 than the other 1993 SMEs and, because LIFI coverage increases with size, may be easier to detect than others if they belong to a group. To avoid this distortion and still have a year in

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[10] Rounding off the figure of 46 758 in Table 4.

which LIFI coverage is better than in 1993, one can look at the sprint gazelles defined in respect of 1998/2003: 40% of the SMEs that in 1998 had between 50 and 250 employees and that still employed anyone in 2003 belonged to a group in 1998. The proportion increases to 55% for sprint gazelles.

The effect of group membership is ambivalent: among 1993 sprint gazelles, those that belonged to a group in 1998 expanded significantly faster during their growth phase but destroyed somewhat more jobs thereafter (Table 11). The greater frequency of disappearances (23% as opposed to 20%), whereas the firms in question were larger SIREN entities in 1998, would tend to suggest that the disappearances were attributable at least as much to intra-group restructuring than to actual net job losses. However, the differentials are relatively slight.

Table 11: 1998 - 2003 trends for 1993 – 1998 sprint gazelles depending on their group membership status in 1998

	Not in a group		In a group	
	Nb of firms	Employees (thousand)	Nb of firms	Employees (thousand)
Employees 1993	1 618	63	1 338	89
Employees 1998	1 618	170	1 338	323
Employees 2003	1 342	168	1 057	307
Increase	716	53	665	94
Decrease	567	19	338	26
Disappearance	319	35	325	84

Interpretation: In 1998, 1 338 sprint gazelles for 1993-1998 belonged to a group, and 1 618 did not. These sprint gazelles had 89 000 employees in 1993 and 323 000 in 1998. Their total number of employees in 2003 was 307 000, as a result of 94 000 jobs created 26 000 destroyed in perennial firms between 1998 and 2003, and the disappearance of 325 firms that had employed a total of 84 000 persons in 1998.

Group membership is probably too broad a criterion for distinguishing between gazelles whose growth is primarily a reflection of dynamism and those whose growth is attributable to intra-group restructuring. From this standpoint, gazelles belonging to small groups of which they are the flagships are probably more similar to independent gazelles than to gazelles belonging to large groups. Annex 3 sheds some light on this issue. Another approach distinguishes between internal growth and external growth. This is the subject of Part II.

II - Monitoring firms and taking account of external growth

II.1 Firms' continuity and their external growth over the period 1998-2001

The tracking of SIREN entities as described thus far has two drawbacks:

- The SIREN number is only an identifier and a firm can change its SIREN number while continuing to pursue its economic activity. This is less of a problem for identifying gazelles – some can escape the method of registration, but this does not call in question the selection of gazelles identified – than for keeping track of them before and after their strong growth phase: the gazelle mortality rate is undoubtedly overestimated.

- Much of the growth achieved by gazelles is likely to come from external growth operations. External growth should not necessarily be disregarded when identifying gazelles; it can be a sign that the firm is in good health. However, what may appear to be external growth from the firm's point of view often derives from intra-group restructuring, so that interpreting the latter in terms of a firm's economic performance is debatable.

Using DADS (an administrative data source showing firms' employee numbers and, by means of an anonymous identifier, making it possible to monitor employees over 2 years), many SIREN changes and restructurings can be identified. This is done by examining grouped flows, i.e. employees in firm A in a given year who change firms at the same time and find themselves together in the same firm B the following year. Annex 2 describes the method used to identify and deal with grouped flows on the basis of the data available.

Business continuity processing concerns the period 1998-2001, when the files making such processing possible were set up.

Firms were selected on the basis of the following criterion: having between 20 and 250 employees either in 1998, or in 2001 (Table 12)

Table 12. Breakdown of firms and employee numbers according to their situation in 1998 and 2001.

	Absent in 1998 or in 2001		Present in 1998 and 2001	
	Number	Employees	Number	Employees
EFF98 : Employees 1998	11 809	633 935	79 964	3 599 944
EFF101 : Employees 2001	8 875	445 797	79 964	4 275 216
Increase in employees			53 253	1 046 111
Decrease in employees			23 337	370 839

Interpretation: The 79 964 firms present in 1998 and in 2001 had 3 59 9944 employees in 1998 and 4 27 5216 in 2001. This change stems from the increase of 1 046 111 jobs in the 53 253 firms whose employee numbers rose and from the loss of 370 839 jobs in the 23 337 firms whose employee numbers decreased.

Taking grouped flows into account results in a net decrease in gross job flows. Subtracting those firms for which the quality of monitoring is too poor[11] has the effect of dividing simple gross flows by three and a half – simple gross flows being the

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[11] Monitoring is considered to be of poor quality when in at least one of the n/n+1 transitions more than half of the employees of n are missing from the files in n+1 or more employees of n+1 are missing in n. 14 000 firms and 250 000 employees are excluded in this way. Some cessations are doubtless excluded wrongly. Better data processing will in time reduce these exclusions which are of little import here since the analysis does not centre on disappearances of firms.

difference between employment at the end of the period and the beginning of the period, as opposed to cumulative gross flows which are the sum of the absolute figures for annual gross flows - for non-perennial firms and results in a 30% decrease for perenials.

Table 13: External and internal growth of firms

	Non-perennial firms		Perennial firms	
	Number of firms	Employees (thousand)	Number of firms	Employees (thousand)
EFF98 : Employees 1998	7 570	417	73 186	3 380
EFF101: Employees 2001	5 438	293	73 186	3 964
FBA: Cumulative gross flows, increase	13 008	346	73 186	1 110
FBB: Cumulative gross flows, decrease	13 008	470	73 186	526
CEX: Cumulative external growth	11 236	252	11 512	326
DEX: Cumulative external decline	11 236	380	11 500	195
PBA: Simple gross flows, increase	5 438	293	48 635	905
PBB: Simple gross flows, decrease	7 570	417	21 316	321
CEXT: Simple external growth	4 631	236	6 761	305
DEXT: Simple external decline	6 777	364	5 160	174
PCA: Internal growth	5 629	99	48 582	655
PCD: Internal decline	4 749	95	21 106	202

Interpretation: In the years when their employment increases, the 73 186 perennial firms gain, cumulatively, 1 110 457 jobs and, in the years when their emplloyment decreases they lose, cumulatively 526 353 jobs. Of the jobs gained, 325 544 derive from external growth operations. Taking account only of the net change between between 1998 and 2001, 48 635 firms gained 904 796 jobs. 6761 firms had a positive balance of 305 067 jobs in their exchanges with other firms. All told, 48 582 firms created 655 199 jobs through internal growth.

The following accounting equalities are verified: EFF101 - EFF98 = FBA - FBD = PBA - PBD = PCA + CEXT - PCD - DEXT

Table 13 concerns firms identified solely by their SIREN code. In Table 14, the SIREN codes of a given firm are consolidated in the event of continuity. Without altering the picture given in the previous table, it is logical that there should be fewer non-perennials and more perennials. That said, there remain a lot of non-perennial firms. Their internal growth/decline flows are well below their external flows. The disappearance of the SIREN identifiers is usually due to more complex operations than a simple change in the SIREN code of a surviving firm, whence the need to take restructuring operations into account.

Table 14: Firms' external and internal growth, taking account of their continuity based on job flows.

	Non-perennial firms		Perennial firms	
	Nb of firms	Employees (thousand)	Nb of firms	Employees (thousand)
EFF98: Employees 1998	5 724	320	74 656	3 472
EFF101: Employees 2001	3 628	196	74 656	4 064
PBA: Simple gross flows, increase	9 352	196	74 656	911
PBB: Simple gross flows, decrease	9 352	318	74 656	319
CEXT: Simple external growth	9 352	127	74 656	298
DEXT: Simple external decline	7 756	263	13 460	163
PCA : Internal growth	9 352	82	74 656	668
PCD: Internal decline	9 352	79	74 656	212

Interpretation: see Table 13. So as to reduce the size of the tables, cumulative flows are not shown. Total numbers (perennial and non-perennial) in 1998 were very slightly lower than in Table 13 (3 792 000 as against 3 797 000) because, amongst the firms which had several SIREN codes, only those for which the quality monitoring condition was verified for each individual SIREN were retained.

Comparing 3-year gazelles obtained from the initial SIREN file – in which case the growth rate needed to come within the last half decile is 77% - and those obtained from the reprocessed file and only taking internal growth into consideration – a growth rate of 66% - shows that 74% of the gazelles selected using one of the procedures are also selected using the other (Table 15).

Table 15: Crossing the fact of being a gazelle on the basis of the initial file and being a gazelle on the basis of the reprocessed file (number of firms)

	Is not a gazelle in the reprocessed file	Is a gazelle in the reprocessed file	Total
Is not a gazelle in the initial file	55 569	794	56 363
Is a gazelle in the initial file	789	2 214	3 003
Total	56 358	3 008	59 366

Scope: firms with between 20 and 250 employees in 1998

While gazelle selection is not very much affected by reprocessing, Table 16 shows that half[12] of the growth recorded by gazelles is attributable to external growth. The share of external growth is the more remarkable in that the period 1998 – 2001 was good for internal growth because of the sound economic situation.

Table 16: External and internal growth of gazelles compared to other firms

	Ordinary perennial firms		Gazelles (in toto)		Gazelles (excluding the most rapid)	
	Nb of firms	Empl. (thou)	Nb of firms	Empl. (thou)	Nb of firms	Empl. (thou)
EFF98: Employees 1998	56 727	2 927	3 003	157	3 002	157
EFF101: Employees 2001	56 727	3 085	3 003	523	3 002	439
PBA: Simple gross flows, increase	33 105	371	3 003	367	3 002	282
PBB: Simple gross flows, decrease	20 627	213	0		0	0
CEXT: Simple external growth	3 261	50	1 486	206	1 485	133
DEXT: Simple external decline	4 403	75	93	1	93	1
PCA: Internal growth	33 568	358	2 789	169	168	157
PCD: Internal decline	20 053	175	198	7	7	7

Only shown here are 1998 SMEs which still existed in 2001
Interpretation:see Table 13.

External growth is very strongly concentrated in gazelles which, in 2001, belonged to a group (see Table 17). Independent gazelles are smaller (but small ones are also less well covered by LiFi) and their growth is less spectacular, though it is essentially internal growth (note that the breakdown between external and internal growth is performed independently of membership of a group). External growth apart, gazelles double their employee numbers in 3 years, whether they belong to a group or not.

Table 17: Internal and external growth of gazelles depending on their belonging to a group

	Gazelles not in groups		Gazelles in groups	
	Nb of firms	Empl. (thou)	Nb of firms	Empl. (thou)
EFF98: Employees 1998	1 048	40	1 955	116
EFF101: Employees 2001	1 048	92	1 955	431
PBA: Simple gross flows, increase	1 048	52	1 955	315
PBB: Simple gross flows, decrease	0		0	
CEXT: Simple external growth	336	11	1 150	195
DEXT: Simple external growth	26	0	67	1
PCA: Internal growth	1 011	42	1 778	127
PCD: Internal decline	34	0	164	7

Interpretation: see Table 13.

While the external growth of independent firms reveals their dynamism, that of firms in a group is harder to interpret. When a small firm in a big group sees the number of its employees rise as a result of external growth, it is difficult to know how much is attributable to the firm's own dynamism and how much to restructuring decisions specific to the group.

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[12] More than half counting all gazelles, including those that gain 80 000 jobs, and less than half if they are excluded.

Reprocessing can also cast some light on the future of gazelles from earlier periods; however the said light is only partial in that it covers only gazelles which had not passed the 250 employees threshold in 1998. Whereas the net growth achieved by the sub-sample of sprint gazelles and Birch-type gazelles was only 23 000 employees (BRN source), the figure was 41 000 in the reprocessed file and internal growth was 51 000 (PCA - PCD, Table 18). This perspective somewhat tempers the pessimistic view of the future of gazelles based solely on monitoring their SIREN codes. It would seem that gazelles are net beneficiaries of growth operations during their rapid growth phase, which increases the overall growth observed, and net losers during the following period, which reduces the overall growth observed.

Table 18: Internal and external growth, between 1998 and 2001, of gazelles defined on the basis of BRN over the period 1993 - 1998

	Nb of firms	Employees (thousand)
Employees 1998 - BRN	3 174	313
Employees 2001 - BRN	2 918	337
EFF98: Employees 1998	3 174	299
EFF101: Employees 2001	2 931	340
PBA: Simple gross flows, increase	1 981	88
PBB: Simple gross flows, decrease	1 142	47
CEXT: Simple external growth	472	25
DEXT: Simple external decline	646	35
PCA: Internal growth	2 107	73
PCD: Internal decline	960	21

Interpretation: see Table 13

Table 18b: Internal and external growth of Birch-type gazelles and sprint gazelles

	Sprint gazelles		Birch-type gazelles	
	Nb of firms	Employees (thousand)	Nb of firms	Employees (thousand)
EFF98: Employees 1998	2491	144	2204	134
EFF101: Employees 2001	2491	336	2204	272
PBA: Simple gross flows, increase	2342	194	2138	139
PBB: Simple gross flows, decrease	129	2	31	0
CEXT: Simple external growth	1023	86	655	38
DEXT: Simple external decline	112	1	80	1
PCA: Internal growth	2200	115	2127	103
PCD: Internal decline	257	7	67	2

Interpretation: see Table 13.

Gazelles identified over the period 1998 - 2002 have a growth breakdown, over 1998 – 2001, which differs according to whether they are sprint gazelles – selected solely on the basis of the magnitude of their growth – or Birch-type gazelles – with the additional criterion of regularity - (Table 18b). The regularity criterion results in the selection of gazelles with less spectacular overall growth but a more significant intenal growth component.

III - Characteristics of gazelles

II.2 Present in all sectors, over-represented in business services

There are gazelles in all sectors, including those which are losing jobs like the consumer goods industries (N16 = 'C'). Table 19 shows sector shares in terms of numbers of employees according to different criteria. Only in the automobile (N16='D') and education, health and social action sectors is the share of the sector among gazelles less than half of its share in total numbers employed (whether for all firms or just SMEs). It is noticeable that long-distance gazelles are especially over-represented in business services (N16='N') which accounted for 29% of employees in 1993 gazelle SMEs, as against 12% of 1993 SME employees. They are usually under-represented in industry and construction and civil engineering. Business service and consumer service gazelles grow faster than other gazelles (share in 2003 gazelle employment bigger than the 1993 share).

Table 19: Breakdown of long-distance gazelles and their employment by sector (N16)

| NES16 | All firms | | | | | | | 1993 SMEs | | | |
| | Employees (thousand) | | Share in employment | | Perennials | Share in gazelles | | Share in employment | | Share in gazelles | |
	1993	2003	1993	2003	2003	1993	2003	1993	2003	1993	2003
B	562	616	4,7	4,3	4,4	3,8	3,1	4,9	4,8	4,7	4,0
C	788	667	6,6	4,7	5,3	3,6	3,3	8,7	6,4	4,7	4,3
D	304	284	2,6	2,0	1,6	0,9	0,6	0,7	0,8	0,3	0,4
E	845	807	7,1	5,7	6,2	3,7	3,4	7,5	6,6	5,2	4,4
F	1451	1452	12,2	10,2	10,9	7,6	6,3	15,3	14,1	9,4	8,4
G	262	234	2,2	1,6	2,2	1,9	0,9	0,3	0,4	0,4	0,4
H	1189	1302	10,0	9,1	7,9	4,6	4,1	11,3	8,9	3,9	3,5
J	2354	2986	19,8	20,9	20,6	27,0	25,8	21,3	24,7	23,0	23,1
K	828	1063	7,0	7,5	8,9	8,2	7,2	6,4	7,5	10,1	9,2
L	588	656	4,9	4,6	5,9	5,4	7,0	1,7	1,7	3,3	3,0
M	221	236	1,9	1,7	1,8	1,4	2,0	2,0	2,0	1,2	1,3
N	1555	2439	13,1	17,1	16,8	25,2	30,3	12,0	14,2	28,7	32,2
P	735	1136	6,2	8,0	5,5	5,5	4,8	4,1	4,0	3,5	4,3
Q	214	382	1,8	2,7	2,1	1,3	1,2	3,6	3,9	1,6	1,4
Total	11897	14261	100	100	100	100	100	100	100	100	100

Interpretation: Firms in the agro-food industry (IAA - N16=B) present in SUSE (BRN + RSI) in 1993 had 562 000 employees and they accounted at the time for 4,7% of wage-earners in firms in that area. Over the period 1993-2003, perennial firms in the said area accounted in 2003 for 4,4% of employment in all perennial firms. 3,8% of the 1993 employees in gazelles identified over 1993 - 2003 were in the IAA, while for 2003 the figure was 3,1%. It follows that gazelles grow on average less rapidly in the IAA. In 1993, 4,9% of SME employees were in the IAA, while for those still in existence in 2003, the figure was 4,8%.

II.3 Gazelles more profitable at the outset but not at the finish

NB: finance companies are not included in the remainder of the analysis.

The gross operating return (EBE/(non-financial assets + BFR) of sprint gazelles is often higher before their rapid growth phase (Figure 6a). A high return is not, however, a necessary condition: the first quartile of sprint gazelles' profitability is thus lower than that of medium or strong-growth companies. This apparent anomaly is due to the relatively large proportion of firms whose gross operating surplus (EBE) is negative among gazelles – a characteristic linked to their belonging to a group[13].

To take account of the gross return being highly dependent on sectoral characteristics (capital intensity, life span of capital goods …), a relative return may be calculated:

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[13] An independent firm with a negative EBE is highly likely to file for bankruptcy. If a subsidiary of a group posts a negative EBE, it does not necessarily mean that it is not viable; it is simply that the legal unit is no longer the right level at which to analyse the accounts.

$$REBr = (REB - Med_s)/(Q3_s - Q1_s)$$

Where Med_s, $Q3_s$, $Q1_s$ are the median rates of return for the third and first quartiles of firms with at least 20 employees in the sector (NES 114 level). The rate of return notion is taken up again in Figure 6b.

Figure 6a: Distribution of gross operating rates of return in 1998 according to growth over the period 1998 - 2003
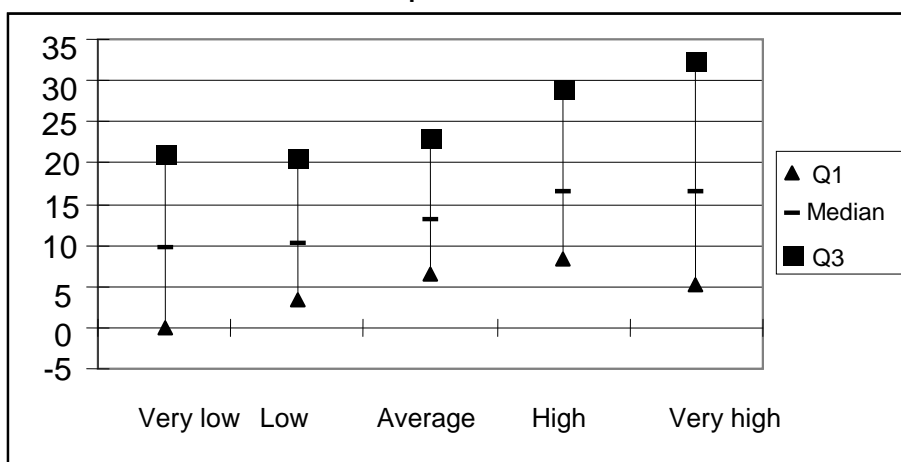
Interpretation: in 1998, the median rate of return of very high-growth firms (sprint gazelles) was 16,5%.

Figure 6b: Distribution of relative gross operating rates of return in 1998 according to growth over the period 1998 - 2003 among firms belonging or not belonging to a group
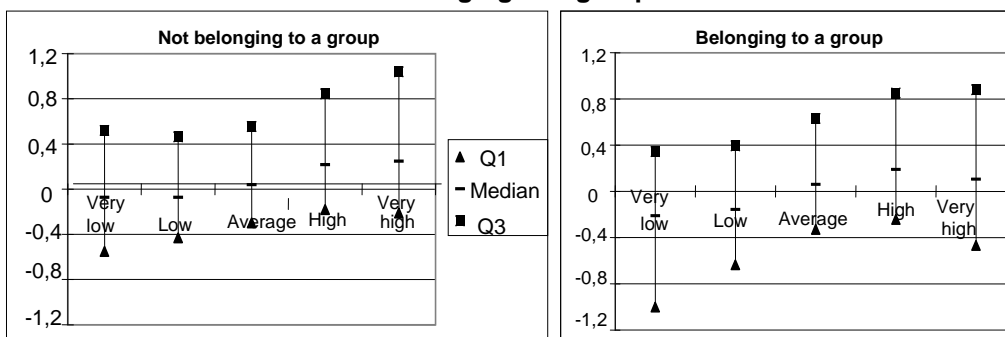
Interpretation: Independent sprint gazelles (very rapid growth) in 1998 had, in 1998, a median rate of return 25% of an interquartile range higher than the median rate of return in their sector.

There are appreciably fewer relatively unprofitable firms among those not listed in LiFi[14] than among those belonging to a group (Figure 6b): the growth posted by group firms can result either from simple intra-group restructuring, independently of the firm's apparent profitability, or it can reflect the firm's buoyancy, in which case belonging to a group partially removes the profitability constraint.

Like the 1998-2003 collection, the 1993 - 1998 sprint gazelles were relatively more profitable at the start of the period when they were being studied, i.e. in 1993 (Figure 7). By 1998, their relative advantage had diminished and they were no longer distinguishable from firms which simply enjoyed strong growth and, above all, it was firms with less than 20 employees in 1993 (or which did not exist) which, in 1998, were the most profitable (Figure 8).

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[14] I.e. small independent firms, plus certain small group firms not counted in the *Liaisons Financières* (LiFi) survey.

**Figure 7: Distribution of relative gross operating rates of return in 1993
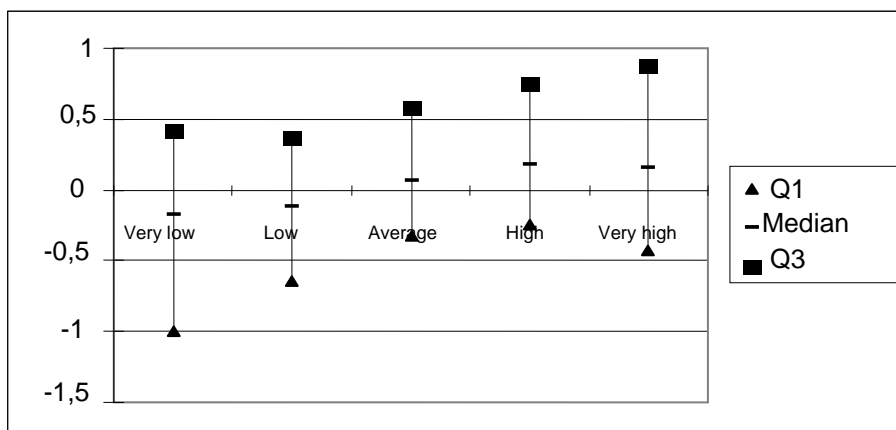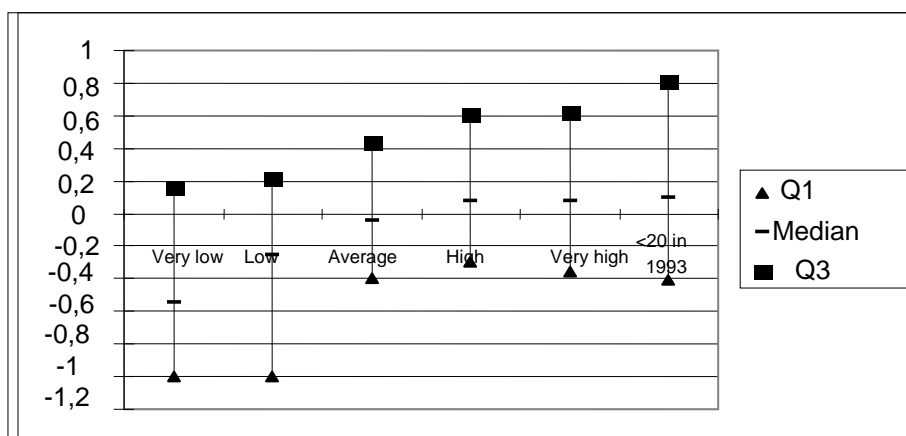according to growth over the period 1993 - 1998**

**Figure 8: Distribution of relative gross operating rates of return in 1998
according to growth over the period 1993 - 1998**

II.4 Relatively higher and persistent borrowing

Despite belonging more frequently to a group and the fact that group SMEs tend to have less debt (the holding borrowing for the group as a whole), sprint gazelles tend to borrow heavily more often – indebtedness being measured here in terms of the financial debt/own capital ratio – than those that grow at a moderate pace. Logically, those that destroy jobs (very low or low growth) often borrow very heavily at the outset (Figure 9a). This relative differential remains at the end of the growth phase (Figure 9b).

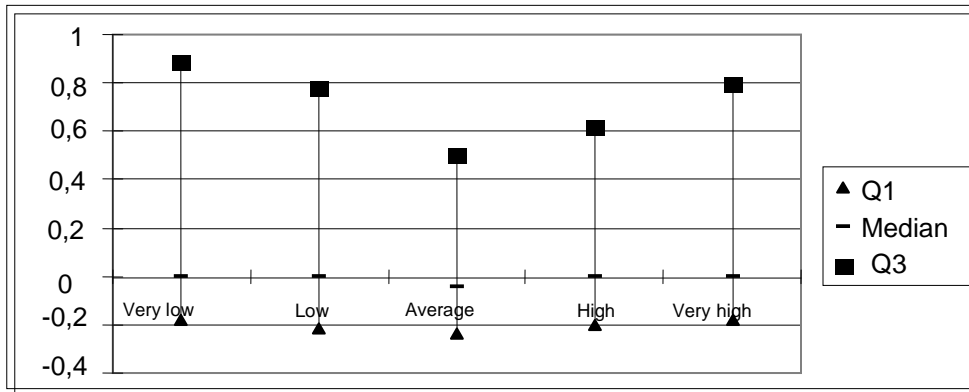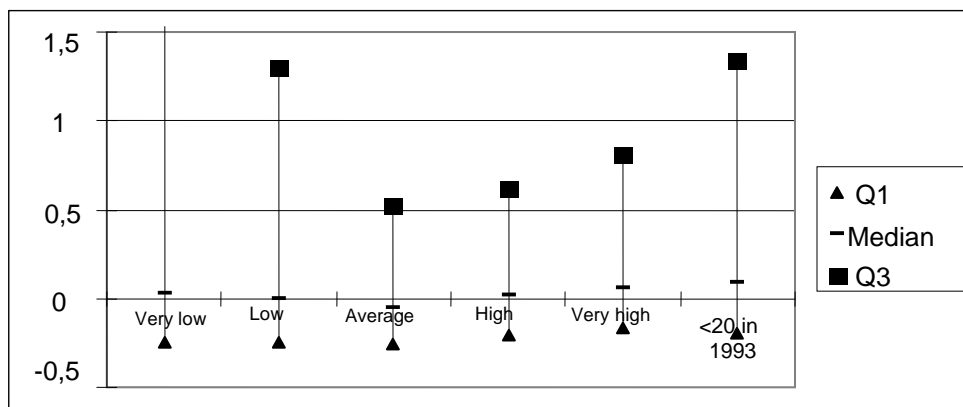**Figure 9a: Relative indebtedness in 1993 as a function of growth over the period 1993/1998**

Figure 9b: Relative indebtedness in 1998 as a function of growth over the period 1993/1998

III - Gazelles resort relatively more to external growth in low-growth sectors

There is no correlation between a sector's growth and the proportion of gazelles in its SMEs: while business services (NES16 = N) have both strong growth and a lot of gazelles, education and health (Q) enjoy almost equivalent growth but have proportionately 4 times fewer gazelles (Table 20). Nor is a sector's growth correlated with the growth of gazelles, the sectors in which gazelles grow the most – automobiles (D), energy (G) and finance (L) – being those with below average growth. On the other hand, strong growth in a given sector seems to be accompanied by external growth accounting for a small share of gazelles' growth, and vice versa: the 4 sectors with above-average growth (11%) have an external growth share of 45% at the most, whereas the 4 sectors whose external growth share is above average (53%) have growth of 7% at the most.

Table 20: Overal growth and external growth share

NES 16	SUSE data						DADS data			
	Employees 1998	Employees 2001	Rate of growth	SME share	Gazelle share	Gr. rate gas	Gr. rate gas	Internal growth rate	External growth rate	External share
B	577	610	5,8	33	4,2	167	156	63	93	40
C	734	714	-2,8	41	2,9	159	140	86	55	61
D	269	286	6,4	11	2,8	456	554	318	237	57
E	826	845	2,2	34	3,0	162	122	41	81	34
F	1 480	1 535	3,7	41	2,8	204	150	72	79	48
G	242	240	-1,0	5	2,6	223	224	179	46	80
H	1 196	1 284	7,3	33	2,2	217	134	65	69	49
J	2 614	2 893	10,6	33	3,9	242	170	86	85	50
K	911	1 030	13,1	33	4,8	170	143	55	89	38
L	600	636	6,0	11	7,0	203	199	123	77	62
M	219	240	9,9	35	3,1	136	143	73	70	51
N	2 407	2 970	23,4	25	9,8	199	172	58	114	34
P	886	1 075	21,3	24	4,0	199	148	41	107	27
Q	278	336	21,1	61	2,5	143	123	55	68	45
Total	13 239	14 693	11,0	31	4,4	200	174	69	92	40

Interpretation: The IAA (NES16 = B) had 577 000 employees in SUSE in 1998 and 610 000 in 2001, i.e. an overall growth rate of 5,8%. 33% of employees in the said sector were in SMEs in 1998. Gazelles accounted in 1998 for 4,2% of SME employees and they grew by 167% between 1998 and 2001. Growth of gazelles in the IAA, defined on the basis of the DADS source, was 159% over the same period - 95% of which was attributable to internal growth and 65% to external growth. The share of external growth in the growth of gazelles in the sector was 41%.

This latter point needs to be checked on the basis of a larger number of observations, i.e. at a more concise level of the nomenclature. The correlation remains positive at NES114 level: the sectors with the strongest growth are also those in which the share of internal growth in gazelles' growth is the largest (Table 21).

Table 21: Cross tabulation of sectors (N114) according to their biggest increases in employment and in the internal growth share

		Share of internal growth among gazelles		
		Small	Average	Large
Growth of sector	Low	5	7	11
	Average	6	9	9
	Strong	12	8	4

Scope: 71 sectors with at least 5 gazelles among their SMEs
The correlation is significant at the threshold of 1,3% according to the Mantel-Haenszel test, pertinent for a matrix table in which the details are ordered.

This prompts questions concerning the role of groups, since external growth is found more frequently among firms belonging to a group. This would require the breakdown of growth between internal and external growth to be extended to all firms, but

consideration here will be confined to what has been done for SMEs[15]. A group's share in a sector is indeed highly correlated with its growth (Table 22, column 1). However, the said correlation in fact reflects both the slower growth of the industry and the bigger share of groups in that industry: it disappears when a dichotomic variable is introduced which distinguishes between industrial sectors (column 2). Introducing gazelles into the regression only makes sense in sectors where there are a sufficient number of SMEs. Instead of restricting the number of sectors, it is preferable to introduce indicators which show effects wherever they are relevant, while at the same time keeping a larger number of observations for the variables insofar as is possible. This gives the following regression:

$$Tcr_i = a + b\ Pgr_i + c\ Ind_i + d\ Ppme_i + e\ PME_i{*}\ Pgaz_i + f\ GAZ_i {*}\ Tcgaz_i + g\ GAZ_i {*}\ Pext_i$$

Where:

Tcri: Is the rate of growth of sector i

Pgri: Is the weight of groups in sector i

Indi: Indicator = 1 if sector i comes under industry (including IAA and energy), otherwise 0

Ppmei: Is the weight of SMEs in sector i

PMEi: Indicator = 1 if at least 5 000 employees in sector i are in SMEs, otherwise 0

Pgazi: = Weight of gazelles in sector i SMEs if PMEi = 1, otherwise 0

GAZi: Indicator = 1 if there are at least 5 SME gazelles in i and if PMEi = 1

Tcgazi: = Rate of growth of sector i gazelles if GAZi = 1, otherwise 0

Pexti: = Share of external growth in the growth of sector i gazelles if GAZi = 1, otherwise 0

Table 22: Factors correlated with sectoral growth over the period 1998 - 2001

	Nb sect[2]	(1)	(2)	(3)	101 obs	Bootstrap	Weighted
Weight of groups[1]	102	-0.21***	-0.07	0,06	0,02	0,06	-0,03
Industry yes/no	102		-0,17***	-0,16***	-0,14***	-0,16***	-0,11***
Weight of SMEs	102			0,08	0,07	0,08	0,11
> 5000 employees in SMEs	102			0,09*	0,07	0,08	0,09
Weight of gazelles/SMEs	86			-0,01	1,55***	0,34	0,31
At least 5 gazelles	86			0,03	0,04	0,01	-0,03
Gazelle growth rate	71			0,04*	0,05**	0,04	0,02
Share of external growth	71			-0,18**	-0,20***	-0,19***	-0,18**
R^2 ajusted		9%	30%	41%			

(1): weight of groups in 2001
Observations: 102 sectors (N114 level) with more than 5 000 employees, then 86 sectors with more than 5 000 employees in SMEs,then 71 sectors among the 86, with at least 5 gazelles
*, **, ***: significant, respectively, at the threshold of 10% , 5%, 1% (this information is only given as an indication, the normality assumption being rejected for the residuals of this regression).

Before commenting on the column (3) findings, it has to be ascertained how robust they are. The fact is that the distribution of the residuals is not a Gaussian distribution and removing a single observation – the one with the most influence on the estimators – spectacularly alters certain coefficients (column 4). A bootstrap estimate shows that only coefficients relating to the industrial nature of the sector and the share of external

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[15] Current data do not allow this breakdown to be performed in a sufficiently reliable manner for the smallest firms.

growth in gazelle growth are robust[16]. Weighting by the number of employees in the sector also brings out these two variables (column 5). These findings are no more than correlations and no causal links can be inferred from them; saying, for example, that "a large proportion of external growth causes lower growth" would seem less pertinent than the converse statement: reduced growth prompts relatively greater recourse to external growth."

Further information can be obtained from a sector typology carried out using an ascending hierarchical classfication (Table 23). The active variables in this classification concern gazelles and the growth rate of the sector. The proportion of SMEs and the share of groups are added as additional variables for descriptive purposes.

Table 23: Sector typology

	Restructuring	Not very dynamic	Dynamic	A super gazelles	Average rates[1]	Non-classified sectors.
Number of sectors	25	24	19	3	71	31
Employees in 2001	3,9 M	5,4 M	2,8 M	0,5 M		2,1 M
Active variables						
Gazelles' external growth share	62% +++	32% - - -	30% - - -	44%	42%	
Ratio of gazelles to SMEs	4%	3% - -	7% ++	13% +++	5%	2%
Gazelles' growth rate (3 years)	156%	139% -	157%	474% +++	164%	
Growth of sector	3% - - -	6% - -	30% +++	8%	12%	6%
Additional variables						
Weight of groups	71% +	59% - -	62%	95% +++	66%	84%
Weight of SMEs	39%	40%	36%	9% - - -	37%	22%

The 71 sectors included in the classification have at least 5 000 exmployees in SMEs and at least 5 gazelles.
(1) : unweighted averages
Interpretation: 19 dynamic sectors employing 2.8 million employees in 2001 grew on average (unweighted) by 30% between 1998 and 2001. Their growth is significantly different at the threshold of 1% of the growth of the sectors as a whole. The share of gazelles in their SMEs is 7% on average, significantly different at the threshold of 5% of the average share of the gazelles in SMEs. The group share in the dynamic sectors, i.e. 62%, is not significantly different from the average weight of the groups participating in the CAH.

- One category of sectors is notable above all for the growth of its gazelles being oriented towards external growth, which justifies their being called "restructuring" sectors, particularly since their growth is well below the average. Groups are slightly over-represented. Among the 25 ailing sectors, 18 are in industry, while also included are the 3 finance sectors.

- A second category of sectors has fewer salient features, apart from the small share of external growth in the growth of gazelles. They have fewer gazelles, the latter grow at a rate short of the gazelle average and - which is consistent with low external growth - groups are under-represented. Their growth is also below the average. Taken in conjunction, these characteristics explain why they are described as "not very dynamic". In addition to 16 industrial sectors, such as furniture and the processing of plastics, for example, they include traditional sectors such as building and civil engineering, road haulage and retailing.

- 19 "dynamic" sectors stand out by virtue of having a particularly high rate of growth: 30% on average. They have relatively more than the average share of gazelles (7%) and, above all, the said gazelles grow mainly thanks to internal growth. Just one of the 63 industrial sectors - fabrication of electronic components

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[16] With the bootstrap estimate also depending on the population which is the subject of the analysis, other tests of robustness not included here confirm this finding.

– ranks among these dynamic sectors, as opposed to 9 of the 12 business service sectors.

- 3 sectors - automobiles (= 2 sectors) and telecommunications – stand out because of the large proportion of gazelles among their SMEs and the very strong growth posted by the said gazelles. This is not, however, reflected in strong overall growth because these sectors have very few SMEs. They are concentrated sectors, with 95% of employees being in groups.

Although there are gazelles in all sectors, their growth cannot be interpreted in the same way from one sector to another. The weight and internal growth of gazelle SMEs are inversely proportional to the weight of SMEs and, in rapid-growth sectors, the growth of gazelles tends to be internal and to account for only a relatively small share of these sectors' growth.

Bibliography

Acemoglu D., Aghion P. et Zilibotti F. (2003), "Distance to Frontier, Selection and Economic Growth".

Bartelsman E., Scarpetta S. and Schivardi F., "Comparative Analysis of Firm Demographics and Survival: Micro-Level Evidence for the OECD Countries", OECD Economics Department Working Papers, N° 348, OECD Publishing.

Birch D. (2002), "Small Business: Slump? What Slump?", Interview in Fortune, December 2002.

Boissonade D. (2003), Comparaison des différents critères de tailles d'entreprise, Cahiers études et recherches de l'observatoire des entreprises, Banque de France.

Cohen E. and Lorenzi J.-H. (2000), Politiques industrielles pour l'Europe. Rapport du Conseil d'Analyse Économique, *La Documentation Française*, Paris.

Davidsson P., Achtenhagen L. and Naldi L. (2005), Research on Small Firm Growth: A Review.

Picart C. (2004), Le renouvellement du tissu productif, *Economie et Statistique*, n°341.

Sapir *et al*. (2004), *An agenda for a growing Europe:The Sapir Report*, Oxford University Press.

Schreyer P. (2000), "High-Growth Firms and Employment", OECD Science, Technology and Industry Working Papers, 2000/3, OECD Publishing.

Sutton J. (2005), "Gibrat's Legacy", Journal of Economic Literature, Vol. XXXV (March 1997).

Wiklund J. and Shepherd D. (2005), "Knowledge Accumulation in Growth Studies: The Consequences of Methodological Choices".

Annex 1: SMEs in terms of turnover

Firms with between 20 and 250 employees usually have a turnover of between €2 and 50 million, but the connection between the employee bracket and the turnover bracket is fairly loose: almost half of all firms with a turnover of between €2 and 10 million have fewer than 20 employees (Table 3a).

Table 1: Cross tabulation of firms according to number of employees and turnover

	Breakdown by turnover bracket					Idem in %				
	<€2M	<€10M	10-50	>€50M	Total	<€2M	<€10M	10-50	>€50M	Total
< 20 employees	587392	44251	3870	667	636180	92.33	6.96	0.61	0.10	100.00
20 – 50	17787	36467	6750	436	61440	28.95	59.35	10.99	0.71	100.00
50 – 250	1109	10106	11926	1776	24917	4.45	40.56	47.86	7.13	100.00
>250	20	116	1708	3603	5447	0.37	2.13	31.36	66.15	100.00
Total	606308	90940	24254	6482	727984	83.29	12.49	3.33	0.89	100.00
< 20 employees						96.88	48.66	15.96	10.29	87.39
20 – 50						2.93	40.10	27.83	6.73	8.44
50 – 250						0.18	11.11	49.17	27.40	3.42
>250						0.00	0.13	7.04	55.58	0.75
Total						100.00	100.00	100.00	100.00	100.00

Scope: Firms liable to tax on actual income, excluding Agriculture, Administration and Interim in 2003.
Interpretation: Of the 61 440 firms with between 20 and 50 employees, 36 467, i.e. 59,35%, have a turnover of between €20 and 10 million. These 36 467 firms account for 40,10% of firms with a turnover of between €20 and 10 million

Gazelles defined on the basis of an employment criterion are not necessarily the same as those defined on the basis of a turnover criterion, but the two groups do coincide relatively well: of the 37 000 perennial firms through 1993 considered to be SMEs from the point of view of both employee numbers (20 to 250 employees) and turnover (€2 to 50M.), 1 028 of the 1 648 gazelles in terms of turnover are also gazelles in terms of employee numbers (Table 3b). And those that are not gazelles in terms of employees record stronger growth in employment (72%) when they are gazelles in terms of turnover than when they are not (7%).

Table 2: Gazelles according to increases in employment or in turnover

		Outside the scope (93 turnover)	Non-gazelles (turnover)	Gazelles (turnover)	Total
Outside the scope (not SMEs in 1993)	Number of firms		24 227	1 469	25 696
	Employees 1993		667	62	729
	Trend: 2003 – 1993		-4	190	186
	Turnover 1993		146	9	155
	Trend: 2003 - 1993		-8	69	61
SMEs 1993 - not gazelles (employees)	Number of firms	9 274	34 141	620	44 035
	Employees 1993	368	1 869	36	2 272
	Trend: 2003 - 1993	16	123	26	164
	Turnover 1993	138	304	5	447
	Trend: 2003 - 1993	35	38	23	96
SMEs 1993 - gazelles	Number of firms	418	871	1 028	2 317
	Employees 1993	20	45	58	122
	Trend : 2003 - 1993	167	112	303	582
	Turnover 1993	26	10	10	46
	Trend: 2003 - 1993	98	12	58	168
Total	Number of firms	9 692	59 239	3 117	72 048
	Employees 1993	387	2 580	155	3 123
	Trend: 2003 - 1993	189	231	519	938
	Turnover 1993	164	460	24	648
	Trend: 2003 - 1993	133	41	151	325

Scope: Perennial firms with, in 1993, between 20 and 250 employees or turnover of between €2M. and 50 M. (€ 2003)
Interpretation: Of the 2 317 SMEs which were gazelles in employee terms, 418 did not, in 1993, have a turnover of between €2 and 50 M., 871 did have turnover in this bracket but were not among the 5% with the highest growth in terms of turnover and 1 028 were also gazelles in terms of turnover. The latter gained

303 000 jobs and €58 billion in turnover between 1993 and 2003 (NB: turnover is not a summable value because of double counting. The amounts of turnover are therefore only given as an illustration).

Annex 2: Identification of grouped flows

NB: It is a matter here, in connection with gazelles, of making use of an ongoing study on grouped flows. This study could be improved. In particular, correcting as far as possible the defects of the DADS source will further reduce company desctruction and creation.

Employees are observed on the 300th day of year n and on the 300th day of year n+1. There is a grouped flow from A towards B (B different from A) if several employees are in n in A and in n+1 in B. There is considered to be a continuity relation between 2 units, A and B, if at least half of the employees in one of the units in year n is in the other unit the other year[17]. If half of the employees of A in year n are in B in n+1, then B is the successor of A. If half of the employees of B in year n+1 were in A in n, then A is the predecessor of B. This gives 4 types of operation involving grouped flows between A (source unit) and B (arrival unit)

		A predecessor of B ?	
		Yes	No
B successor of A ?	Yes	C: Continuity	V: Sale
	No	E: Externalisation	Flg: simple grouped flow

The word "externalisation" is confined here to the creation of a new unit, B, out of another unit A, whether the said unit A continues its activity or is split into several entities (if no entity receives the majority of the employees of A, the splitting up of A into k units will correspond to k externalisations). If A's externalised jobs do not bring with them at least half of the employees of B, a simple grouped flow will be involved. They will be taken into account only if they concern at least 10 employees.

The entity concerned can be a SIREN or a SIRET.

The job flows concerned by each operation (FO) need to be identified in order for growth to be broken down into internal and external growth.

Notations:

EFAn, EFAn+1: employees in the source unit in n and n+1

EFBn, EFBn+1: employees in the arrival unit in n and n+1

Nb: number of employees in A in n and in B in n+1

For a simple grouped flow, only nb can be taken, even if in annual cross-section terms the flow is doubtless underestimated (employees involved in the grouped flow may have left B at the time of the observation in n+1 or not yet be in A at the time of the observation in n)

For an externalisation, it is possible to use either nb, or EFBn+1, employment in the newly created entity. Nb is clearly inadequate, as is shown by the example of A being split between B and C: what is to be done with the difference, which can be quite substantial in view of the quality of the monitoring, between EFAn and the sum of the

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[17] To allow for the fact that too many employees disappear from the files from one year to the next, the criterion has been made less stringent: B is the successor of A if at least half of the employees of A in the files in n and n+1 are in B in n+1, on condition that this grouped flow accounts for at least one-third of A's employees. The criterion of one half is essential to ensuring that A has only one successor.

two nb? EFBn+1 can, on the other hand, be overestimated. This risk can be reduced by subtracting B's other sources of external growth.

Flows linked to an externalisation: $FOE_{AB} = (EFBn+1 - EFBn) - Sum (Flg_{XB} + FOV_{XB})$

Similarly,

Flows linked to a sale: $FOV_{AB} = (EFAn - EFAn+1) - Sum (Flg_{AX} + FOE_{AX})$

It will be noted that, in the case of externalisation, EFBn (or EFAn+1 for a sale) is usually zero. However, there are in some cases employees remaining prior to the creation or after the sale (this can be explained by the propensity of DADS to assign periods of employment over the whole year in the event of uncertainty). Thresholds are used to filter these cases so as not wrongly to reject externalisations (resulting in strong job creation in B which would then be considered to be perennial).

There is apparent circularity in that FOV has to be known in order to calculate FOE, and vice versa. However, there is in fact no circle because if A performs an externalisation towards B, this implies that EFBn+1 < EFAn (otherwise there would be continuity) and, by the same token, if C is sold to B, EFCn<EFBn+1. So it is sufficient to repeat this enough times to solve the algorithm. In practice, 2 times suffice.

Taking DEX as external decline, CEX as external growth and $FB_A = EFAn+1 - EFAn$ as the gross change in employee numbers gives the following imputations for the assigning firm A and the beneficiary B:

For the assigning firm A,

- If the unit has changed identifier or been sold (the fact that there may or may not have been externalisations or simple grouped flows is unimportant from the point of view of the assigning firm, but is important for the beneficiaries): $DEX = - FB_A$

- For a perennial unit with externalisation(s): $DEX = \Sigma FOE_{AX} + \Sigma Flg_{AX}$

For the beneficiary B

- If the unit derives from an externalisation: $CEX = FB_B$

- If the unit is the beneficiary of sales: $CEX = \Sigma FOV_{XB} + \Sigma Flg_{XB}$

- If the unit derives from a change of identifier: the symmetry with the assigning firm cannot be respected, i.e. it is not possible to take $CEX = FB_B$ since, in this case, any growth peculiar to the unit would be considered to derive from external growth; hence $CEX = FOV_{AB} + \Sigma FOV_{XB} + \Sigma Flg_{XB}$.

Annex 3: Taking account of the weight of the gazelle in its own membership group

It is difficult when analysing the growth of a group gazelle to know what is attributable to the firm's own buoyancy and what stems from restructuring operations decided on at group level. The challenge here is not to ascertain what is due to internal growth and what is due to external growth – this having been dealt with elsewhere – but to determine what is attributable to a decision by the firm – in which case external growth is a sign of its dynamism – and what derives from a group decision – in which case external growth may be no more than the outcome of intra-group restructuring. Independent gazelles are therefore viewed favourably, but they are in a minority. That said, there are many small groups in which just one firm accounts for the majority of employees. In such cases, the firm's growth mainly reflects its own dynamism.

To ascertain to what extent gazelles match this last example, firms belonging to a group may be divided up between:

- Group firms, which comprise over 90% of employees in their group

- Firms in a majority in their group, which comprise between 50% and 90% of employees in their group

- Firms in a minority in their group

Gazelles will be studied over the period 1999 - 2003 so as to ensure the best coverage of small firms (Diane was added to LiFi as of 1999).

Table 1: Percentage of gazelles according to the weight of the firm within the group

		Independent	Group firms	Majority	Minority	Total
1999	Number of firms	37 471	6 821	5 348	16 224	65 864
	% of gazelles	3,9%	3,8%	5,0%	8,0%	5,0%
2003	Number of firms	33 626	7 582	5 698	18 958	65 864
	% of gazelles	3,5%	6,3%	6,8%	6,6%	5,0%

Interpretation: In 1999, gazelles accounted for 3,9% of independent firms, 3,8% of group firms, 5% of firms in a majority in their group and 8% of firms in a minority in their group.

Gazelles are all the better represented in 1999 when they carry little weight within their group (Table), which does not argue in favour of group gazelles having their own dynamism. The picture is very different at the end of their growth phase (2003): the larger proportion of gazelles in group firms may stem from gazelles posting a different rate of growth within the groups, or it may be due to independent firms changing into group firms, but it is more likely that certain groups restructured by concentrating the majority of their employees in a firm which looked at the time like a gazelle. Without constituting irrefutable proof – for which the groups would have to be monitored – the fact that gazelles are appreciably over-represented among firms which shift from minority to majority status or to that of group firm does tend to substantiate the argument (Table).

Table 2: Transition between 1999 and 2003

1999 / 2003	% of gazelles				Number of gazelles				Group growth			
	A	B	C	D	A	B	C	D	A	B	C	D
A Independent	3,3%	6,3%	7,2%	5,9%	1015	138	100	190				
B Group firms	3,2%	4,1%	3,5%	3,5%	32	169	32	27		120	253	
C Majority	5,8%	9,5%	4,4%	2,9%	39	73	119	34		83	100	
D Minority	5,7%	18,9%	19,6%	7,3%	73	96	132	1006		5	27	21

Interpretation: 18,9% of the firms which in 1999 were in a minority (D) within their group and which, in 2003, accounted for more than 90% of employment in their group (B), were gazelles over the period in question. There were 96 such gazelles. For those gazelles which keep the same head of group, the median growth of their group is 21% when they are in a minority in 2003, as in 1999, and is 5% when they move from minority status (D) to that of of group firm (B).

The growth of groups in which gazelles are in a minority is relatively slight, whereas for groups in which they are in a majority and for group firms it is very strong: in the latter cases, the growth of the gazelle reflects the growth of the group of which it is the main component.

If gazelles which shift from independent status to group firm status (138), those which shift from group firm status to majority status (32) and those which remain group firms (169) or which keep their majority status (119) are put in the same category as independent gazelles (1015 gazelles, see Table), the autonomous growth presumption then concerns 45% of gazelles (instead of 31% if the calculation is confined to those that continue to be independent).