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Assessing the effects of a nonfinancial business accelerator program on firm performances: the Bpifrance SME accelerator¹

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Abstract.

In France, the SME accelerator program, implemented by Bpifrance since 2015, have the rare feature of being strictly non-financial. Participating companies receive advice, training and networking opportunities, although their participation in the accelerator does not give them preferential access to investment or equity schemes, as is the case for many other accelerator programs. This somewhat unusual aspect of the Bpifrance program makes it possible to identify the effect of the non-financial component of an accelerator program. In addition, the Bpifrance SME accelerator concerns ongoing established firms and not early stage firms as usual in the literature. We evaluate the effect of this specific program based on accounting data from businesses covering the period 2010-2018, comparing three cohorts of participating businesses with a set of businesses presenting the same characteristics that did not participate in the program. For the last two cohorts, we find the program has a positive effect on revenue with an increase of the order of ten percentage points, 16 percentage points on value added, and a tenfold increase on businesses' capital expenditure under the program.

Keywords: *accelerators, innovation support, ex-post evaluation, difference in differences, panel data.*

JEL Codes: *C23, D21, G34, L53.*

1. Introduction

Since their first appearance in the US in the mid-2000s, accelerators have become a prominent aspect of the entrepreneurship landscape. These selective and intensive programs help business owners, usually grouped into cohorts, to develop their growth potential. In doing so, they reduce uncertainty about the viability of the business project and founders use this information to decide whether to continue or shut down (Yu, 2020). A positive effect of these programs on firm growth has been demonstrated in a statistically rigorous manner by few empirical studies (Gonzalez-Uribe & Leatherbee, 2018; Hallen, Cohen and Bingham, 2020).

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In this paper, we assess the effects on firm performances of a French business accelerator program, the Bpifrance's SME accelerator. Launched in 2015, it is a selective program combining business consulting activities, training of management teams and networking. This program has two interesting features. First, it focuses on existing firms that are already of a certain size, whereas most studies evaluate the effects of accelerators at an earlier stage of the business project. It thus allows us to check whether the positive effects of accelerators can also be applied to a scaling up in a company's development. Second, the Bpifrance's accelerator does not include any financial component. Participation in the accelerator does not give firms preferential access to investment or equity schemes, as it is the case for many other accelerator programs. In the same vein as Gonzalez-Urbe & Reyes (2021), this paper looks at a "non-financial" program, i.e. one that provides no funding but rather offers only education, mentorship and networking, while most existing studies do not specify the respective effects of the financial and non-financial components of accelerators.

We evaluate the effect of this program based on accounting data from businesses covering the period 2010-2018, comparing three cohorts of participating businesses with a large set of businesses presenting the same characteristics that did not participate in the program. Our results indicate that programs to develop the human and social capital of entrepreneurs, are potentially a highly effective seam to be mined. More specifically, results suggest that the Bpifrance SME accelerator has likely produced improvement in the organization of firms accelerated through the non-financial components of the SME accelerator: Mentoring, Networking and possibly the training.

2. Literature review

Accelerators are an innovation in the landscape of business development support programs that have been the subject of a growing volume of research. Three reviews of the literature have been devoted to them (Hausberg and Korreck, 2018; Gliedt et al., 2018; Crisan et al., 2019), as well as one collective work (Drori and Wright, 2018). The last comprehensive review, by Crisan et al. (2019), includes 98 academic articles published on this topic over the last 15 years. This literature consists mainly of case studies, based on interviews with company stakeholders and tracking various metrics. The contribution made is both descriptive and conceptual. It consists of defining the specific features of accelerator programs relative to other business support programs. Although sometimes presented as a particular form of incubator (Hausberg and Korreck, 2018), the vast majority of studies recognize enough specific features to put them in their own class of instrument. Unlike incubators, which precede them in the business plan life cycle, accelerators do not necessarily target new micro-enterprises and do not focus on providing a hosting environment conducive to business development. They are more akin to "boot camps" of a fixed duration, within which a cohort of executives from existing businesses receive training and mentoring.

In one of the first studies, Miller and Bound (2011) point out that the accelerator model combines a small number of ingredients found in varying proportions in all programs. They highlight five main features that make accelerators unique relative to other business support programs: i) Even if they are selective, access to accelerators is open to all businesses that can apply; ii) Participating businesses may have access to financing facilities, in the form of a pre-seed investment, sometimes in exchange for equity; iii) The training recipients are businesses' management teams, which are small teams. Access to this training is therefore not limited exclusively to individual founders of businesses; iv) The accelerator consists of a time-limited support program that blends scheduled events and intensive coaching; v) The program is organized on the basis of cohorts or "classes" of start-ups rather than purely individual monitoring of participating businesses. In a later study also published by the Nesta Foundation, Clarysse et al. (2015) specify that the duration of the programs is three to six months and that the programs are punctuated by Demo Day type group events with investors. The same study also indicates that the size of the cohorts ranges from 12 (Techstars) to 50 participants (Y Combinator).

Of these studies, there are very few rigorous evaluations of the impact of accelerator effects using advanced methods to assess public policy. The main difficulty lies in identifying the causal effect of the program by distinguishing it from the effect of selection at the point of program entry, which cannot be done in a case study, no matter how in-depth it is. Such identification requires the implementation of non-experimental or experimental impact assessment methods, following the dichotomy used in evaluation econometrics from Rubin's (1974) model. These methods contribute by constructing a counterfactual corresponding to the trajectory businesses would take in the absence of involvement in an accelerator program.

The study by Hallen et al. (2017) is covering 328 Internet-related start-ups accelerated between 2011 and 2013 in eight accelerators (500 Startups, AngelPad, DreamIt Ventures, Excelerate Labs, LaunchBox Digital, Seedcamp, Techstars and Y Combinator). The authors match a sample of 164 accelerated firms with 164 non-accelerated firms in the same industries, presenting the same characteristics in terms of the timing of their very first wave of venture capital and the nature of their investors. They found no effect from acceleration on the speed at which firms raised venture capital or on the ability of firms to achieve a high level of business on the Internet. However, they did find high positive effects on the sub-samples from the first generation of accelerators (Techstars and Y Combinator) and then more moderate effects from subsequent ones. They concludes that there are positive effects from participating in an accelerator, without actually distinguishing the precise mechanisms by which these effects are obtained. The samples of businesses, mainly from Crunchbase, are often too small to be able to draw any conclusions.

Gonzalez-Uribe and Leatherbee (2018) evaluate the Chilean program, Start-Up Chile, which is a public-funded investor-led accelerator offering to his participants an access to financing without equity stakes, shared office space for co-working and the possibility of being selected for an exclusive sub-program called the School of Entrepreneurship. In this sub-program, participants receive services typical of accelerator programs: advice and guidance through monthly meetings with program managers and mentors, networking through invitations to high-level events, and advertising on the Start-Up Chile website. The evaluation exploited the fact that the program accepts a fixed number of participants in each cohort, based on the result of an eligibility test, and that there is also a fixed proportion of 20% of each cohort that joins the School of Entrepreneurship. The authors used the discontinuity regression method, which allowed them to estimate local average treatment effects (LATE) consisting of basic accelerator services (i.e. access to financing and shared workspace) and participation in the entrepreneurship school. The result was a significant increase in financing raised in the first 4.75 years after entering the accelerator. The specific effect of the entrepreneurship school was to obtain additional financing and capital invested. Conditional on receiving seed capital, the authors find causal evidence about the effects of entrepreneurship schooling on new-venture performance. It resulted in a doubling of the number of employees, helping companies move from a mean of 0.9 to 1.8 employees. On the other hand, they didn't find any evidence about average treatment effects for seed capital on its own. They do not highlight a specific effect of access to financing on the size of the workforce or on the risk of business failure.

While these works indicates positive effects from acceleration, they do not always distinguish the mechanisms producing these effects. Yu's work (2020) allows deeper interpretation about these mechanisms at play. Her sample contains 898 accelerated businesses from 13 U.S. programs matched to a sample of 898 non-accelerated businesses, which are similar in terms of year of creation, location, trade sector, pre-accelerator financing and managerial experience. With an exact matching carried out manually following a multi-step procedure, the study shows that accelerated firms receive less financing overall than non-accelerated firms and that they are more exposed to the risk of business failure. The theoretical interpretation is that the support offered by the accelerator provides more information on the viability of the business project for the founders themselves, who are then more keenly aware of possible

losses. The support given reduces uncertainty about the quality of their business plans, enabling them to make faster financing and exit decisions.

As mentioned earlier, accelerators combine several ingredients. Some of them consist of non-financial support that can increase the human, social, entrepreneurial, and managerial capital of entrepreneurs, such as consulting, networking, and training. The main purpose is to improve the effectiveness of business owners and managers “to help them learn quickly, create powerful networks, and become better entrepreneurs” (Miller and Bound, 2011). Other ingredients correspond to access to financing in the form of a loan or equity investment, and it is then the economic and financial capital of the firm that is at stake. Very few studies address the respective roles of these two sets. A rare exception is Gonzalez-Uribe and Reyes (2021) who assess the effect on new venture performance of the entrepreneurship schooling provided by business accelerators in the absence of financing. Using data from ValeE, a local ecosystem business accelerator launched in 2015 in Colombia, covering 135 projects (35 participants and 100 nonparticipants) followed during five years, they confirm that accelerator participation has large positive impacts on businesses performances even without any financial support.

These studies are based on very small samples of mostly microenterprises, averaging 2 to 3 employees and all with fewer than 10 employees. Accelerators are evaluated on their ability to identify the best business projects and never on their ability to develop existing businesses.

3. Derivation of the testable hypotheses

In line with Yu (2020), we derive a set of testable hypotheses used as guidelines for assessment of the Bpifrance accelerator. However, it is feasible to adapt the Yu (2020) model to our case. Unlike with the uncertainty considered by Yu (2020) on the feasibility and the quality of the project, in our case with Bpifrance accelerator, the ongoing firms usually do not face uncertainty about the quality of the project, but rather on the firm organization or on the market on which they operate. The advices provided by the mentoring, by the networking or by the training may help to reduce these uncertainties. For instance, the networking end mentoring could suggest new firm organization or new market positioning for accelerated firms (for instance considering upmarket). In the latter case this information could increase the price and the gross operating surplus (or the net profit), the value added or the revenue (in current prices) of the firms that benefit from Bpifrance accelerator program, especially in case of moved upmarket.

In the same perspective, the mentoring, the networking and the training could provide information to firms about organizational inefficiencies of the firm and on the way to improve the organization of the firms, for instance applying new process of production reducing the unit production costs. For constant markup rate, this could reduce the selling price and increase the competitiveness of the accelerated firms and as a consequence increases sales (in constant price) and, in the medium-long run, increase employment in accelerated firms in comparison to the situation where the firm does not benefit from the accelerator program. In this case we could also expect an increase in turnover for accelerated firms.

Improving firm organization or moving upmarket involves in their implementations an increase in capital expenditures too.

So the testable hypotheses are the following:

- H1. The firms that benefit from the Bpifrance SME accelerator should have a higher value added, revenue or capital expenditures than those that do not benefit from the program.
- H1a. Organizational improvements should lead to a significant positive revenue gap with non-accelerated firms.

- H1b. Market positioning and upmarket should lead to a significant positive value added and gross operating surplus gap and net profit with non-accelerated firms.

- H2. In the middle-long run a significant increase in employment should be observed in the accelerated firm - that improved its organization - compared the non-accelerated firms.

We will use this set of testable assumptions to select the outcome variables and interpret our results.

4. The Bpifrance accelerator and selection of accelerated firms

50 BpiFrance accelerator cohorts were effectively created from 2015 till 2019. Those accelerators involve 1,500 business accelerated. There is a great diversity in Bpifrance accelerator programs. Some of them are national, other are regional, industry specific or related to the status of the business (SME or MidCaps). The durations of the accelerators are not identical. For instance, the usual duration for the industry specific accelerators is six months.

The SME accelerator is the first accelerator proposed by Bpifrance in 2015 (PME1). It presents significant difference concerning the type of firms accelerated. It does not concern early stage ventures but ongoing and established SMEs. But it shares a part of the components with historical accelerator (Ycombinator and Tecstart): business consulting (Advisory Initiative team), training for business owners and their management teams (University team), networking, organization of events and access to a bundle of services (Support team). Contrary to the historical accelerators, it does not provide any financial support such as access to equity and non-equity financing. As a consequence, the SME Bpifrance accelerator does not contain any demo-day. Another feature distinguishes the SME Bpifrance accelerator from the historical ones: its duration. The historical accelerators last from 3 to 6 months and could be view as intensive boot camps. This intensity and timing could not be implemented with established SME firms without inducing a lock-in effect (Card *et al.* (2018)) for the participants. The Bpifrance SME accelerator lasts 2 years (see the schedule provided in Appendix 1).

In addition, BpiFrance offers to their clients a national business network: Excellence with a selective access. The criteria to join this network are the following:

- 5 million euros turnover
- 1 million funds raised for startups
- A growth potential of the company
- International development
- A willingness of the leader to be part of a network and to interact with his peers

Most of the firms that have benefited from SME accelerator were members of the network Excellence.

Once the firm has been selected in the Excellence network by Bpifrance, its founder can apply to join a SME accelerator. Discussions with Bpifrance supervisors of the SME accelerator program reveals that most of the time the firms from Excellence network applying to the SME accelerator programs are accepted, but, if a firm is solicited by Bpifrance to join an accelerator, Bpifrance faces frequently refusals.

So the first step of the selection process (to join Excellence network) is driven by Bpifrance on criteria related to the firm performances and founder willingness. It is worth noting that both the accelerated firms (treated firms) and the firms belonging to the Excellence group but not accelerated (control group) are concerned by this selection.

In the second step (to join the SME accelerator) the selection is rather driven by the willingness of the founder to join the SME accelerator. One way to explain the fact a founder decides to join or not an

SME accelerator is to suppose as Yu (2019) that the founder compares the expected gain of reducing uncertainty about the firm organization or the market on which they operate to the fee (about 30 000€) of joining the accelerator. If the expected gain from joining the accelerator exceeds the fee to participate to the accelerator, the founder decides to join the accelerator; in the other case the founder does not join the accelerator.

The first SME accelerator PME1 is a special case. It was the first accelerator proposed by Bpifrance with few advertisements on it and no fee applied to join this accelerator. This explains probably the reason why PME1 accelerator was the most populated accelerator among the three accelerators considered here. If we have in mind the Yu (2019) model we could conclude that most of the SME firms belonging to the Excellence group are potentially candidate. The net gain to join an accelerator is strictly positive in the absence of fee and the number of applicants should be in this case much higher than for the next accelerators. However, this channel should be moderated by the lack of advertisement for PME1. Most of the firms were proposed by local agencies of Bpifrance to the department of business support that have in charge of the accelerators. For this reason, we can assume that Bpifrance has proceeded to selection for joining the accelerator based on their performances. This is confirmed by the department of business support of Bpifrance and by statistical comparisons between the performances of accelerated firms and non-accelerated firms one year previous the accelerator starting date. For the following SME accelerators, much more advertisement has been made. The admission in the accelerator PME2 and PME3 has been implemented through two channels: the application from firms belonging to Excellence network and the proposal candidature made by local agencies.

5. Data and descriptive statistics

The first part of the Section is devoted to the presentation of data and the description of the accelerated firms, comparing the different cohorts of SME accelerators. In the second part of the Section, we explain what kind of control group of firms we use.

Basic statistics

Our study focuses solely on Bpifrance's SME accelerators, which are national in scope and targeted at small and medium-size enterprises (SMEs). It covers the first three cohorts of accelerated companies in Bpifrance's SME accelerators. As we have already noted, the first cohort (PME1) entered the scheme in March 2015 to exit in March 2017 (note the name PMEx comes from the French abbreviation for SME). The second cohort (PME2) started in March 2016 to end in March 2018, while the third cohort (PME3) joined in March 2017 and left in March 2019. We have chosen not to include PME4 which started in March 2018 given the small number of businesses for which we have information in 2018. We also chose not to examine the first cohort of mid-caps (ETI1) that entered in October 2016 and exited in October 2018 because it included a small number of businesses (25) presenting characteristics quite different from those of the SME cohorts.

The three cohorts of SME accelerated businesses (PME1, PME2 and PME3) total 171 businesses (Table 1). Bpifrance has made a database available (coming from Altares database) to us for these companies containing a large number of variables from the income statement (P&L) and balance sheet for the entire 2010-2018 period. However, the accelerated businesses included some parent companies (belonging to a holding), equating to holding company activities. In the absence of consolidated financial statements, we decided to not include them. In addition, the sample also included accelerated companies linked to mutual funds. As the performance metrics for such companies are very different from those of other companies, we opted to also exclude them from the sample. The final sample of accelerated businesses (Table 1) includes 142 firms breaking down into 57 for PME1, 49 for PME2, and 36 for PME3 (as we

use a balanced panel of perennial firms, we kept in the final sample only firms present from 2013 till 2017 – for this reason, 3 firms are excluded for PME2 and 4 for PME3).

Table 1. Sample of accelerated businesses.

	Start date of the accelerator	End date of accelerator	Number of accelerated businesses	Number of accelerated firms excluding parent companies and investment funds	Final number of accelerated firms considered in the balanced panel sample
PME1	March-15	Feb-17	60	57	57
PME2	March-16	Feb-18	59	52	49
PME3	March 17	Feb-19	52	40	36
Together	–	–	171	148	142

Sources: Bpifrance and ALTARES data.

Note: the last column reports the number of firms that are perennial on the overall period 2010-2017.

It is important to mention that there is considerable heterogeneity in the businesses both within and across the three cohorts. Table 2 shows descriptive statistics for each cohort for four variables: revenue, number of employees, gross operating surplus and net profits. The values are calculated for the year preceding entry into the accelerator (2014 to 2016 depending on the cohort) and for the year following exit from the accelerator, i.e. three years later (except for PME3, entry in 2017, where we observe only the second year's in the accelerator, i.e. 2018). The businesses in PME1 had revenue of nearly €25 million, gross operating surplus of €1.8 million, net profits of nearly €900,000 and 118 employees. It can be seen that the companies that joined PME2 had lower values for all these metrics, with €20.5 million in annual revenue and 97 employees. The trend towards a smaller size in accelerator participants continued with PME3 with an average revenue of €15.5 million and a workforce of 66 employees. The average size of the businesses passing through successive SME accelerators is getting smaller and smaller.

Table 2. Characteristics of businesses participating in national accelerators PME1 to PME3.

		T-1	T+2*	Change over 3 years
PME1	Revenue	24,774,454	30,184,314	22%
	Number of employees	118	132	12%
	Gross operating surplus	1,818,372	2,028,807	12%
	Net profit	895,158	641,194	-28%
PME2	Revenue	20,572,780	30,836,684	50%
	Number of employees	97	122	26%
	Gross operating surplus	1,036,064	2,601,656	151%
	Net profit	513,799	1,313,825	156%
PME3	Revenue	15,493,089	23,176,045	50%
	Number of employees	66	90	36%
	Gross operating surplus	1,009,379	961,090	-5%
	Net profit	749,658	555,089	-26%
3 cohorts	Revenue	20,903,865	33,709,092	61%
	Number of employees	97.4	129	33%
	Gross operating surplus	1,335,518	2,028,807	52%
	Net profit	724,169	830,910	15%

Sources: Bpifrance and ALTARES data.

Scope: 142 companies participating in Bpifrance's national SME accelerator between 2015 and 2017.

The values reported are company-level average

Notes: *Second year of treatment (T+1) for PME3.

For all three accelerator cohorts, we see an increase in most of outcome variables (revenue, value added, employment, gross operating surplus)⁵. It appears to be more pronounced for PME3 than for PME2 and for PME2 than for PME1. Between the year before entering the accelerator and the year after exiting, the increase in average revenue is 22 per cent for PME1 and 50 per cent for the next two cohorts. The increase in headcount is 12 percent for PME1, and 26 percent and 36 percent respectively for the next two cohorts. The average increases in gross operating surplus and net profits are more erratic and show contrasting values from cohort to cohort.

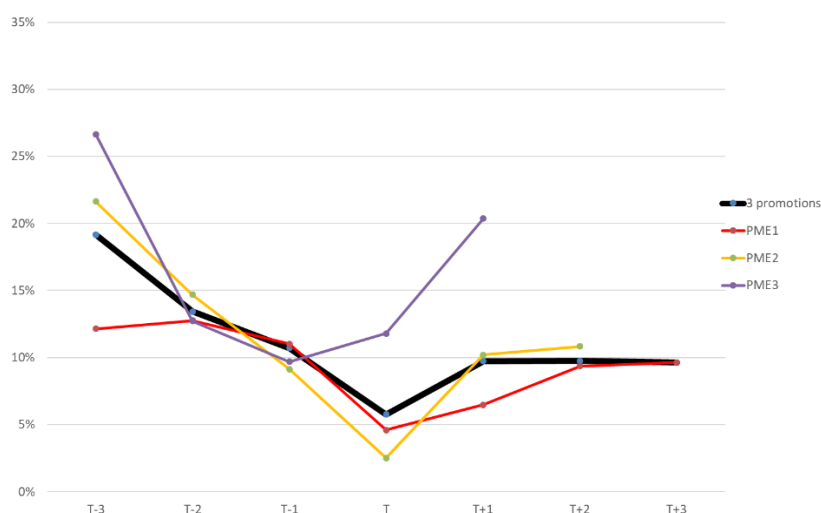
For each of the cohorts, only a small number of observations are available and the figures are thus quite sensitive to the presence or absence of a particular business, the nature of the metrics and outlier values. We illustrate this sensitivity in Figure 1, which shows the changes in revenue for the three cohorts according to the average growth in revenue. The x-axis is time in years, centered on the year of entry into the accelerator, T, with T+1 then being the second year of participation in the program, T+2 and T+3 denoting the years following the program, and T-3 to T-1 denoting the years preceding entry into the program. Note that while year T+1 is observed for all three cohorts, year T+2 is observed only for PME1 and PME2, and year T+3 is observed only for the oldest cohort of PME1.

⁵ The evolution of net profits is more erratic across the cohorts: an increase for PME2 but a decrease for PME1 and PME3.

The point of greatest interest is the general profile of all the graphs, which show a more or less flattened V-shape for all indicators, centered on the first year of the program. The left-hand side of the V could be interpreted as a selection effect, from an agnostic perspective, that could operate either when the firm joins the Excellence network or one of the SME accelerators. In both cases, businesses are selected because they exhibit strong revenue growth. The low point in T could be interpreted as a consequence of joining the accelerator: businesses entering the accelerator are reorganizing, and slower sales growth rates may be a consequence of this reorganization. The right branch of the V could be related to benefiting from the accelerator program and suggest a revenue increase associated to joining the program.

The magnitude of increasing in revenue seems indeed more pronounced for PME3 than for PME2 or PME1. Note that this may be partially due to changes in the size of accelerated businesses, which are smaller in the most recent cohorts. The scale of the least positive effect is around a two percentage points per year increase in revenue after acceleration.

Figure 1: Sales growth rates, before, during and after entering the accelerator.



Sources: Bpifrance and ALTARES data.

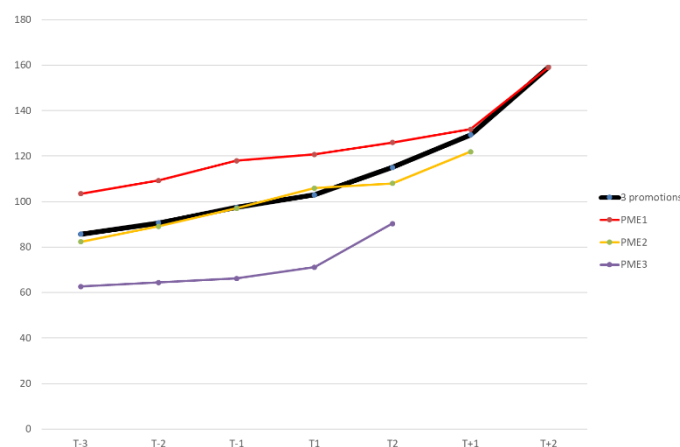
Revenue is the variable for which descriptive statistics are closest to the expected profile. For example, if we look at the change in the headcount, shown in Figure 2, the profile over time appears to be less affected by participation in the accelerator. No upturn is visible in T1, except perhaps for PME3. Headcount does not appear to exhibit a negative effect related to the entry in the accelerator⁶. Graphs for changes in value added, export sales, net earnings and gross operating profit show very erratic patterns.

⁶ Two explanations can be put forward:

- The first is a possible labor retention effect. In practice, during a downturn in business (measured by revenue or value added), the effects on headcount do not appear instantaneously. Businesses that adjust their workforce instantly run the risk, if the downturn is only temporary, of incurring costs (redundancy costs and then recruitment costs) that are much higher than the costs of maintaining an unchanged labor force.

- Another possible explanation is that the numbers included here represent jobs measured in terms of headcount. Companies do have short-term methods to reduce the number of hours worked: elimination of overtime, non-renewal of temporary staff, etc. In this respect, using the number of hours worked (not available in the databases to which we had access) would probably provide a more marked lock-in effect.

Figure 2: Size of labor force before, during, and after entering the accelerator.



Sources: Bpifrance and ALTARES data.

Construction of the control group

The accelerator’s effects are evaluated by comparing the performance of businesses that have participated in the accelerator, sometimes referred to as “treated” businesses in line with Rubin’s model (1974), with the performance they would have experienced in the counterfactual situation of not participating in the scheme. A central difficulty in any impact evaluation is the unobservability of the counterfactual situation. We thus have to construct the counterfactual for each accelerated business. In a purely experimental setting, the assignment of firms to the treated and control groups would be done on the basis of a simple random draw. This is the best way to ensure that the two groups are perfectly comparable, because they are selected in exactly the same way, through random selection. In this quasi-experimental setting, it is important to construct a control group that is selected in the same way as the “treated” group in order to avoid selection bias.

We have chosen to form the benchmark group of businesses from companies that are members of the “Excellence” network, which is an internal Bpifrance label designating companies that are Bpifrance clients with high performances⁷. Several arguments justify this choice. First, these businesses were selected by Bpifrance on the basis of their performance, which is significantly better than that of the bank’s other client companies, and *a fortiori* that of non-client businesses. Interviews with Bpifrance’s management teams confirmed that Bpifrance viewed these businesses as having the same characteristics as accelerated businesses. Their performance is comparable to that of the accelerated businesses before their selection for the accelerator, which is statistically verifiable. Finally, the businesses participating in the accelerator were selected exclusively from within this network (with one exception). The businesses labeled “Excellence” are in fact the smallest group of businesses that present the closest characteristics to the accelerated businesses.

The “Excellence” database includes approximately 5,250 businesses for which we have income statement (P&L) and balance sheet data for the period 2010-2018. Here again, we have only considered businesses that are not parent/holding companies or mutual funds. In addition, in our assessment, we wish to compare companies with identical characteristics. In particular, we have restricted the sample to businesses that were SMEs prior to the accelerator entry date. We removed from the database those businesses for which any information was missing over the period. Since information is available in 2018 only for a subset of variables or businesses, we consider businesses over 2010-2017.

⁷ See the second paragraph of Section 4 which depicts the selection criteria to join the Excellence network.

The final sample of businesses is thus a balanced panel of 885 perennial businesses over 2010-2017. Among them, there are 142 accelerated businesses.

Descriptive statistics are produced for the entire sample to show the difference between the accelerated businesses (“treated” group, 142 businesses) and the set of benchmark “Excellence” businesses (“control” group, 743 businesses) by selecting those SMEs that did not participate in an accelerator (Table 3). The levels of revenue and value added are significantly higher one year before PME1 (2014) in accelerated businesses in PME1 than in the control group, but growth rates of the outcome variables do not display any significant gap between the two groups; we could not exclude that a selection process was at work for PME1 accelerator. On the other hand, there is no difference in the growth rates and level for outcome variables (revenue, value added, capital expenditures) and also for the level for gross operating surplus and employment) between 2013 and 2014 for PME2 and PME3 businesses compared to the control group.

Table 3. Descriptive statistics. One year before entering the SME accelerator programs.

	2014			2015			2016		
	PME 1 (1)	Control Group PME1 (2)	Difference (1)-(2)	PME2 (1)	Control Group PME2 (2)	Difference (1)-(2)	PME3 (1)	Control Group PME3 (2)	Difference (1)-(2)
$\Delta \log(\text{Revenue})$	9.3%	7.1%	2.1pp	5.7%	7.8%	-2.1pp	9.7%	4.9%	4.8pp
$\Delta \log(\text{V.A.})$	15%	6.2%	8.8pp	4.2%	4.1%	0.1pp	9.4%	6.6%	2.8pp
$\Delta \text{Capital exp.}$	€0.8k	€28k	€27k	€223k	€91k	€132k	€36k	€109k	-€74k
Revenue	€24.7m	€16.3m	€8.4m**	€19.2m	€16.7m	€2.4m	€17.6m	€17.3m	€0.3m
Value Added	€7.6m	€4.6m	€2.9m**	€5.1m	€4.7m	€0.4m	€5.7m	€4.9m	€0.8m
Capital Exp.	€732k	€760k	€28k	€938k	€762k	€175k	€598k	€892k	-€293k
Gross Operating Surplus	€1.4m	€0.9m	€0.5m	€1.2m	€0.9m	€0.3m	€0.9m	€0.9m	€0.01m
Workforce	113	66	47***	77	67	10	88	68	20

Source: Bpifrance and ALTARES data.

Scope: 142 businesses participating in Bpifrance’s national SME accelerator between 2015 and 2017.

Notes: average value of the metrics on each of the two groups of companies.

***significant deviation at the 1% threshold, ** significant deviation at the 5% threshold, * significant deviation at the 10% threshold.

Table 4 shows, for each cohort and each year, the percentage of accelerated businesses that achieved mid-cap status. We see that in 2015, 5.26% of PME1 businesses acquired mid-cap status. In 2016, 5.55% of PME1 and 4.65% of PME2 acquired this status. In 2017, 1.96% of PME1, 7.5% of PME2 and none in PME3 achieved mid-cap status. Cumulatively, by 2017, 13% of businesses in PME1 and 12.8% of businesses in PME2 had achieved the status of mid-cap.

Table 4. SME firms that achieved mid-cap status after participating in the SME accelerator.

	PME1	PME2	PME3
2015	5.26% (3 firms)	-	-
2016	5.55% (3 firms)	4.65% (2 firms)	-
2017	1.96% (1 firm)	7.50% (3 firms)	0.0%

Sources: Bpifrance and ALTARES data.

Scope: 142 businesses participating in Bpifrance’s national SME accelerator between 2015 and 2017.

Notes: Percentages of accelerated businesses that became mid-caps after entering the accelerator (number of firms).

Table 5 provides initial indications of the potential impacts of SME accelerators on different variables: growth rates of revenue and value added, absolute changes in investment and the transition from SME to mid-cap status. It suggests that companies in the PME1 and PME2 cohorts are characterized by more frequent status changes from SME to mid-cap than are “Excellence” businesses. In addition, firms in the PME3 cohort, and to a lesser extent PME2, experienced significantly higher growth rates in revenue and value added than did “Excellence” businesses.

Table 5. Descriptive statistics for all periods after entering the accelerator.

	2015-2017			2016-2017			2017		
	PME1 (1)	Control Group SME1 (2)	Difference (1)-(2)	SME2 (1)	Control Group SME2 (2)	Difference (1)-(2)	SME3 (1)	Control Group SME3 (2)	Difference (1)-(2)
$\Delta \log(\text{Revenue})$	5.5%	7.0%	-1.4pp	8.8%	6.4%	2.4pp	17.0%	7.5%	9.5pp**
$\Delta \log(\text{V.A.})$	-1.6%	5.5%	-7.1pp	10.2	5.9%	4.4pp	17.9%	5.0%	12.8pp*
$\Delta \text{Capital Exp.}$	33K€	92K€	-59K€	97K€	69K€	28K€	126K€	22K€	104K€
Mid-cap status (2017)	13.0%	4.0%	9.0pp***	12.8%	4.0%	8.8pp***	0%	4.0%	-4%

Source: Bpifrance and ALTARES data.

Scope: 142 businesses participating in the Bpifrance national SME accelerator between the year the accelerator starts and 2017.

Notes: average value of the indicators on each of the two groups of companies.

***significant deviation at the 1% threshold, ** significant deviation at the 5% threshold, * significant deviation at the 10% threshold.

6. The econometric model

It should be noted that these figures are averages over periods during and after the SME cohorts. Therefore, these descriptive statistics do not enable significant differences to be spotted between accelerated and non-accelerated businesses at each of the dates during and after entry into the SME accelerator. Furthermore, we are not reasoning here under the *ceteris paribus* assumption and we are probably comparing accelerated businesses with “Excellence” businesses with potentially different characteristics.

One difficulty in the assessment is the small number of accelerated businesses. As the businesses within each cohort are very different, the average performance shown by a cohort can be very sensitive to the performance of a small number of businesses with a strong growth dynamic. The variance in performance indicators is high, making the performance gap between accelerated and control groups less significant.

The choice of evaluation method will be guided largely by these elements. A propensity score method requires a large number of observations and is little-suited to the size of our samples. We preferred a panel difference in differences method (Ashenfelter and Card, 1985), on businesses that survived from 2010 to 2017. It consists of comparing the changes in the performance of the businesses in the accelerated group with that of the control group, before and after implementation of the accelerator (Figure 1). This approach has the advantage of considering all the businesses belonging to the “Excellence” network in the control group, provided they were SMEs before the accelerator was set up. In order to compare businesses that are comparable, we have adopted the *ceteris paribus* assumption by using control variables to account for differences in characteristics. These variables correspond to the size of the business measured by five levels of workforce size, the business sectors at an intermediate level (broken down into 21 industries), economic and financial ratios characterizing the businesses

(margin, economic rate of return, capital intensity, labor productivity, share of exports in revenue) both in absolute level and in growth rate (equation 1). These latter variables are delayed by two periods in order to avoid any potential simultaneity bias. Finally, to account for cyclical variations, time dummy variables for each year are added to the model.

Our empirical strategy is based on a differences-in-differences estimation on a balanced panel of perennial firms within the framework of econometrics of evaluation (see for instance Rubin, 1974). We begin modeling the given the outcome variable that refers to the performance variable (eg. revenue, value added, capital expenditures) for firm i at time t as follows:

$$\begin{aligned}
y_{i,t} = & \beta_0 + \sum_{t_1=2015}^{2017} \beta_{PME1,t_1} \cdot I_{i \in PME1,t \geq t_1} + \sum_{t_2=2016}^{2017} \beta_{PME2,t_2} \cdot I_{i \in PME2,t \geq t_2} + \beta_{PME3,2017} \cdot I_{i \in PME3,t \geq 2017} \\
& + \delta_1 \cdot \text{markup_rate}_{i,t-2} + \delta_2 \cdot \text{eco_r_rate}_{i,t-2} + \delta_3 \cdot \text{cap_intens}_{i,t-2} \\
& + \delta_4 \cdot \text{share_revenue_exported}_{i,t-2} + \delta_5 \cdot \text{labor_productivity}_{i,t-2} + w_i + \eta_{i,t}
\end{aligned} \tag{1}$$

$\eta_{i,t}$ is the usual error term of the econometric equation. $I_{i \in PME1,t \geq t_1}$ is a step dummy equal to 1 if firm i benefits from PME1 accelerator and if year of observation is greater than or equal to starting year of PME1 (2015), and otherwise to 0. As well, $I_{i \in PME2,t \geq t_2}$ is a step dummy equal to 1 if firm i benefits from PME2 accelerator and if year of observation is greater than or equal to starting year of PME2 (2016), and otherwise to 0. $I_{i \in PME3,t \geq 2017}$ refers to a variable that is equal to 1 if firm i benefits from PME3 accelerator and if year of observation is equal to starting year of PME3, that is 2017. The β_{PME_j,t_j} 's (with $j=1, 2$ or 3) should measure the impact of SME accelerator j at time t .

To control for selection bias, we first include as explanatory variables *markup_rate*, *eco_r_rate*, *cap_intens* and *share_revenue_exported* that correspond respectively to the markup rate, the economic rate of return, the capital intensity and the share of revenue from exports; they allow taking account for selection bias based on observed factors while attempting to evaluate the effect of SME accelerators. These variables are lagged twice to avoid potential simultaneity bias. Second, since not all control variables are included nor observed, we also add in the equation a firm specific effect w_i that refers to all control variables that are unobserved to the econometrician and are time invariant. This unobserved heterogeneity can capture a lot of factors, such as managerial ability of the founder, its education level, the willingness to interact or co-operate with her/his peers. We assume w_i to be correlated with our control variables. To identify the accelerators' effects through β_{PME_j,t_j} and Equation (1), the error term has to be independent from explanatory variables, but conditional on the firm unobserved component. This assumption has more chance to hold than the usual one without the firm fixed effect.

To estimate Equation (1) we differentiate it. However, including the unobserved firm fixed effect may not be sufficient to take account for selection on unobserved variables because w_i is time invariant. To improve our model, we can take account for the fact the variation in the performance variable may depend on the industry the firm belongs to, by introducing in the differenced equation a set of business sector dummies, equal to one if firm i belongs to business sector s . Moreover, the variation in the performance variable may also rely on the firm size (in terms of number of employees); we thus include a set of dummy variables. To account for the economic situation, we include a set of year dummies. Finally, to account for potential effects of trends in the control variables, we add their levels lagged by two years, thus obtaining an augmented differences-in-differences model.

Besides, as we try to evaluate the effect of a policy, it is usual to ensure that any effect detected is not an artifact related to the presence of different trends between businesses in the accelerated (“treated”) group and those in the control group. We thus add as an explanatory variable in the augmented differences-in-differences model that corresponds to an artificial accelerator that did not exist at 2013 (“placebo”). The augmented differences-in-differences model we consider is thus the following:

$$\begin{aligned}
\Delta y_{i,t} = & \beta_0 + \beta_1 \cdot I_{i \in \text{placebo}, t=2013} + \sum_{t_1=2015}^{2017} \beta_{\text{PME1}, t_1} \cdot I_{i \in \text{PME1}, t=t_1} + \sum_{t_2=2016}^{2017} \beta_{\text{PME2}, t_2} \cdot I_{i \in \text{PME2}, t=t_2} \\
& + \beta_{\text{PME3}, 2017} \cdot I_{i \in \text{PME3}, t=2017} + \sum_{j=2014}^{2017} \lambda_j I_{t=j} + \sum_{e=1}^4 \gamma_e \cdot \text{employment_size}_{i \in e, t-2} \\
& + \sum_{b=1}^{18} \theta_b \cdot \text{b-sector}_{i \in b} + \tau_1 \cdot \text{markup_rate}_{i, t-2} + \tau_2 \cdot \text{eco_r_rate}_{i, t-2} \\
& + \tau_3 \cdot \text{cap_intens}_{i, t-2} + \tau_4 \cdot \text{share_revenue_exported}_{i, t-2} \\
& + \tau_5 \cdot \Delta \text{labor_productivity}_{i, t-2} + \delta_1 \cdot \Delta \text{markup_rate}_{i, t-2} + \delta_2 \cdot \Delta \text{eco_r_rate}_{i, t-2} \\
& + \delta_3 \cdot \Delta \text{cap_intens}_{i, t-2} + \delta_4 \cdot \Delta \text{share_revenue_exported}_{i, t-2} \\
& + \delta_5 \cdot \Delta \text{labor_productivity}_{i, t-2} + u_{i,t}
\end{aligned} \tag{2}$$

Where $\Delta z_{i,t}$ is the first difference for all variables $z_{i,t}$ (either the outcome variable or the explanatory variables, including treatment variable). $\Delta I_{i \in \text{PME1}, t \geq t_1} \equiv I_{i \in \text{PME1}, t=t_1}$ is a dummy that is equal to one if firm i benefits from PME1 and is observed at time t equal to the starting year of PME1, i.e. 2015. The same holds for $\Delta I_{i \in \text{PME2}, t \geq t_2} \equiv I_{i \in \text{PME2}, t=t_2}$ for PME2 ($t_2=2016$), and for $\Delta I_{i \in \text{PME3}, t \geq t_3} \equiv I_{i \in \text{PME3}, t=t_3}$ for PME3 ($t_3=2017$). $I_{t=j}$ is a year dummy that is equal to one if year of observation t is equal to year j . $\text{employment_size}_{i \in e, t-2}$ that is equal to one if the headcount of business i belongs to interval e at time $t-2$. $\text{b-sector}_{i \in b}$ is an industry dummy that is equal to one if firm i belongs to business sector b . $u_{i,t} = \Delta \eta_{i,t}$ is the new error term of the econometric model.

$I_{i \in \text{placebo}, t=2013}$ refers to the placebo accelerator is equal to one for all firms accelerated (in PME1, PME2 and PME3) at year 2013 and 0 otherwise. The β_1 coefficient should be not statistically significant different from zero if there is no placebo effect. If, on the other hand, there is a significant effect from this dummy accelerator, it indicates that the two groups of firms show distinct trends as regards performance variables. In this case, it is useful to estimate a differences-in-differences-in-differences model: to describe $y_{i,t}$, we introduce a firm-specific trend that refers to an additional source of heterogeneity. It is captured by introducing a fixed business effect in the variation of $y_{i,t}$. If $y_{i,t}$ is the natural logarithm of the outcome variable, this firm fixed effect corresponds to the average growth rate of the performance variable over the considered period (holding the explanatory variables fixed). This model refers to the random growth model (Heckman and Hotz, 1989; Polachek and Kim, 1994). In this context, we allow both the unobserved firm fixed effect and the firm specific trend to be arbitrarily correlated with the observed explanatory variables. In particular, since our indicators of participation to the SME accelerator are part of the differences-in-differences-in-differences model, it allows the participation to SME program to depend both on firm-specific trends and level effects. In the random trend model, $\beta_{\text{PME}_j, t_j}$'s identify the effect of Bpifrance SME accelerators if the error term of our model is independent of explanatory variables conditional on both the specific trends and level effect.

7. Results and discussion

Estimated equation

The review of descriptive statistics in the previous section revealed two main characteristics of SME accelerators. The first was differences in business size (in terms of number of employees), with headcounts of 118, 97 and 66 employees for the PME1, PME2 and PME3 cohorts respectively. We can therefore see that the business size decreases for the most recent cohorts.

The second important characteristic was the speed and scale of the appearance of increase in performance variables from the point a business enters an accelerator. Examination of Figure 1 suggests occurrence of increase in revenue in 2016 and 2017 for PME1, i.e. one to two years after the year of entry into the accelerator. On the other hand, for PME2, the increase in revenue seems to appear as early as 2017, i.e. one year after the accelerator entry year, and is of greater magnitude. Finally, for PME3, the same increase is observed 2017, i.e. in the first year.

These characteristics as a whole suggest that the accelerator's effects appear sooner the more recent the national SME cohort is. Viewed from the perspective of the change in business sizes with each cohort, this difference in the timing of effects could be attributed to the increased ability of smaller businesses to change their organization quickly. A further explanation is the probable improvement in the support and the advices given to businesses in each new cohort of the national SME accelerator. Regarding the scale of the positive effects, which are larger for recent cohorts, this again suggests a link with the average business size per cohort, which decreased over the period studied.

Another noteworthy point in these characteristics (Figure 1) is that the various cohorts share a common date for the appearance of positive effects on sales, i.e. 2017. However, for PME1 there is a lower increase in revenue in 2017 than for the other cohorts, and there is also a positive change specific to PME1 in 2016.

As a consequence, we estimated the model given by Equation (2) where we impose that coefficients for PME2 and PME3 are equal for 2017, and coefficients for PME1 for 2015 and for PME2 for 2016 are equal to zero ($\beta_{PME2,2017} = \beta_{PME3,2017}$; $\beta_{PME1,2015} = 0$ and $\beta_{PME2,2016} = 0$). Since the null hypothesis is not rejected with a *p-value* of 21%, we finally estimate the following equation:

$$\begin{aligned}
 \Delta y_{i,t} = & \beta_0 + \beta_1 \cdot I_{i \in \text{placebo}, t=2013} + \beta_{PME23,2017} \cdot (I_{i \in PME2, t=2017} \cup I_{i \in PME3, t=2017}) \\
 & + \sum_{j=2014}^{2017} \lambda_j I_{t=j} + \sum_{e=1}^4 \gamma_e \cdot \text{employment_size}_{i \in e, t-2} \\
 & + \sum_{b=1}^{18} \theta_b \cdot \text{b-sector}_{i \in b} + \tau_1 \cdot \text{markup_rate}_{i, t-2} + \tau_2 \cdot \text{eco_r_rate}_{i, t-2} \\
 & + \tau_3 \cdot \text{cap_intens}_{i, t-2} + \tau_4 \cdot \text{share_revenue_exported}_{i, t-2} \\
 & + \tau_5 \cdot \Delta \text{labor_productivity}_{i, t-2} + \delta_1 \cdot \Delta \text{markup_rate}_{i, t-2} + \delta_2 \cdot \Delta \text{eco_r_rate}_{i, t-2} \\
 & + \delta_3 \cdot \Delta \text{cap_intens}_{i, t-2} + \delta_4 \cdot \Delta \text{share_revenue_exported}_{i, t-2} \\
 & + \delta_5 \cdot \Delta \text{labor_productivity}_{i, t-2} + u_{i,t}
 \end{aligned} \tag{3}$$

Where we impose the additional constraint that the coefficients for PME1 in 2016 and 2017 are zero.⁸ $\beta_{PME2,2017}$ refers to the impact in 2017 of PME2 and PME3 when it is supposed to be identical among the two cohorts of SME. Corresponding results are displayed in Table 6.⁹

Findings

We considered the set of outcomes variables: the ones deduced from the testable hypotheses: revenue, value added, gross operating surplus, net earnings, capital expenditures, salaried workforce size and a dummy variable indicating whether the business moved from SME to mid-cap status.

We have reported the results of the difference in differences estimates in Table 6 for the variables of interest corresponding to presence in an accelerator (detailed results are shown in Tables A-2a and A-2b in Appendix 2).

We achieve effects significantly different from zero for the PME2 and PME3 accelerators on revenue, value added and capital expenditures. Thus, participation in the PME2 or PME3 accelerators appears to have generated on average an additional 9.8 percentage points of growth in revenue relative to the control group (or the baseline situation that would have been seen in the absence of an accelerator). Similarly, the value added of accelerated firms in PME2 and PME3 appears to have grown by an average of 16 percentage points, and capital expenditure by accelerated businesses shows average additional investment of €257,409, a tenfold increase in investment for accelerated businesses.

For companies that participated in PME1, a positive effect is observed for transition from SME to mid-cap status.¹⁰ The probability of growing from SME to mid-cap appears to have increased by an average of 7.5 percentage points.

We do not see significant effects from the SME accelerators on gross operating profit, net earnings, and the size of the workforce. With regard to headcount, several possible explanations can be given for the lack of effect for the PME2 and PME3 cohorts, which nonetheless recorded increases in revenue and value added. Firstly, the response to a short-term increase in business is often greater use of overtime and temporary work. We use workforce measured in terms of the number of individuals employed (the only variable at our disposal). Of course, this variable does not take into account overtime and use of temporary work. In this respect, the number of hours worked provides a more accurate description of the short-term effects on employment in the broader sense. An additional explanation lies in the costs of adjusting the actual headcount (cost of recruitment, training, etc.). These costs encourage firms to temper their recruitment when business increases.

⁸ To get Equation (3) from Equation (2), we impose that coefficients for PME2 and PME3 are equal for 2017; that coefficients for PME1 for 2015, 2016 and 2017, and that coefficients for PME2 for 2015 and 2016 are equal to zero ($\beta_{PME2,2017} = \beta_{PME3,2017}$; $\beta_{PME1,2015} = \beta_{PME1,2016} = \beta_{PME1,2017} = 0$ and $\beta_{PME2,2016} = 0$). The null hypothesis is not rejected with *p-value* of 48%.

⁹ For estimated coefficients of the whole specification of Equation (3), see Appendix 2, Table A-2a and the column (2) for each outcome variable. In column (1) for each outcome variable, we report the detailed results for the specification where we impose ($\beta_{PME2,2017} = \beta_{PME3,2017}$; $\beta_{PME1,2015} = 0$ and $\beta_{PME2,2016} = 0$).

¹⁰ In this case, we estimate Equation (2) by imposing $\beta_{PME2,2017} = \beta_{PME3,2017} = 0$, and $\beta_{PME2,2016} = 0$. To get the findings of column (2), we also impose $\beta_{PME1,2015} = 0$.

Table 6. Evaluation of the effects of Bpifrance’s national SME accelerator on accelerated business cohorts from 2015 to 2017. Difference in differences estimation.

Acceleration indicator / Explained variable	Variation in logarithm of revenue	Variation in the logarithm of VA	Change in capital expenditure	Achieved mid- cap status
Falsification test (effect of the accelerator if it had been implemented in 2013 in all businesses accelerated later)	0.033 (0.237)	-0.025 (0.600)	530.213 (0.994)	-0.009 (0.201)
Effect of PME2 and PME3 accelerators in 2017	0.098** (0.042)	0.160** (0.024)	257,409.000* (0.073)	
Specific effect for PME1 in 2016				0.075* (0.069)
Number of observations (businesses*years)	4,046	3,935	4,034	4,062
Coefficient of determination (R ²)	0.033	0.027	0.015	0.205

Sources: Bpifrance data, ALTARES and Appendix 2.

Scope: 885 Excellence member businesses, 142 of which participated in Bpifrance’s national SME accelerator between 2015 and 2017.

Notes: For each variable, the coefficient and the associated critical probability are provided (the smallest probability for which the coefficient is considered to be statistically significantly different from 0). Significance: *** (or ** or *) refers to a coefficient that is significantly different from 0 to 1% (or 5% or 10% respectively).

Discussion

How can we interpret these results in the light of our testable hypotheses? First we find no effect of SME accelerators (PME1, PME2 and PME3) on both the gross operating surplus and the net profits. The gross operating surplus and the net profit are the outcomes that should be improved if the accelerated firm has revised its market positioning or upmarket. So Hypothesis H1.b seems to be rejected.

We found also a positive effect on the revenue, the value added. These results seem to be more in line with the results expected for improvement the firm organization induced by the accelerator. In addition, we get significant effect for the accelerated firms on capital expenditures. So, hypothesis H1.a seems to be not rejected.

As a whole, those results suggest that the Bpifrance SME accelerator has likely produced improvement on the accelerated firm organization through the non-financial components of the SME accelerator: Mentoring, Networking and possibly the training.

Ultimately, for PME1 companies, we detected a positive effect from the accelerator on the transition from SME to mid-cap, but without any impact on revenue or value added. We saw the opposite conclusion for PME2 and PME3. This outcome is explained by the fact that businesses accelerated in PME1 are larger (whether viewed in terms of headcount, revenue or value added) than the firms of the control group. They are therefore closer to the thresholds for changing from SME to mid-cap, without revenue or value added being statistically affected by the accelerator. It should also be noted that the PME1 accelerator, unlike the PME2 and PME3 accelerators, was financed fully by Bpifrance, which strongly stimulated applications and increased selection in favor of businesses closest to mid-cap size. So we cannot exclude that the positive “effect” is attributable to a selection in the entry of the accelerator. So we to consider with caution this result that could be simply the consequence of the selection process implemented by Bpifrance for this particular cohort.

On the other hand, businesses participating in PME2 and PME3 are smaller, especially for the PME3 accelerator. Therefore, while their revenue and value added were positively impacted by the accelerator, this was not enough for the business concerned to reach the thresholds for shifting from SME to mid-cap (see Table A-3 in Appendix 3).

Robustness

Table 7. Evaluation of the effects of Bpifrance’s national SME accelerator on accelerated business cohorts from 2015 to 2017. Diff-in-diff-in-diff estimates.

Acceleration indicator / Explained variable	Variation in logarithm of revenue	Variation in the logarithm of VA	Change in capital expenditure
Falsification test (effect of the accelerator if it had been implemented in 2013 in all businesses accelerated later)	0.035 (0.245)	0.004 (0.947)	-39,939.539 (0.652)
Effect of PME2 and PME3 in 2017	0.059 (0.174)	0.159** (0.028)	297,496.438* (0.077)
Number of observations (businesses*years)	4,036	3,935	4,034
Coefficient of determination (R2)	0.016	0.024	0.022

Sources: Bpifrance data, ALTARES and Appendix 2.

Scope: 885 Excellence member businesses, 142 of which participated in Bpifrance’s national SME accelerator between 2015 and 2017.

*Notes: For each variable, the coefficient and the associated critical probability are provided (the smallest probability for which the coefficient is considered to be statistically significantly different from 0). Significance: *** (or **, or *) refers to a coefficient that is significantly different from 0 to 1% (or 5% or 10% respectively).*

Regardless of the performance variable examined, falsification tests reject the presence of an accelerator effect in 2013. Therefore, the hypothesis of a common trend between the group of accelerated businesses and the control group cannot be rejected.

However, to ensure the robustness of our results, we estimate our differences-in-differences-in-differences model, allowing for a firm specific trend in the outcome variable.¹¹ The results are reported in Table 7. In general, the magnitude of the effects appears to be maintained. However, the effect on revenue is no longer significantly different from zero (the *p-value* is 17.4%). This result may be due to the loss of degrees of freedom by adding fixed business effects in Equation (3).

Conclusion

Accelerators first appeared in the mid-2000s in the United States and have since spread around the world. These selective and intensive coaching and training programs for business owners are akin to “training camps” for business managers. While there is already a vast literature on these programs, mainly qualitative in nature, there is very little quantitative evaluation of the impact of accelerators and no such study has been conducted in France. Moreover, the numerous studies that conclude that accelerators have positive effects fail to identify the nature of the mechanisms at work. It is not known whether access to financial capital is more important for firms than strengthening their entrepreneurial capital Bruhn and Schoar (2010) who found that access to advisory services and managerial capital is often lacking for many businesses and is ultimately more important than access to financial capital.

One interesting feature of the SME accelerator program implemented by Bpifrance since 2015 is that it is strictly non-financial. Participating businesses receive advice, training, support and networking in a group, making progress collectively, without their participation giving them preferential access to investments and equity schemes, as is the case for many other accelerators.

¹¹ Corresponding detailed results are available in Appendix 2, Table A-2b.

This original aspect of the program makes it possible to identify the impact of the non-financial component of an accelerator. To this end, we evaluated the impact of the Bpifrance accelerator using businesses' accounting data covering the period 2010-2017, using difference-in-differences and difference-in-differences-in-differences and panel data modeling to compare the first three cohorts of SME accelerated businesses with businesses presenting the same characteristics that did not participate in the program.

For the two cohorts in 2016 (PME2) and 2017 (PME3), our results indicate a positive effect of the program in 2017 on both the annual revenue growth rate, of the order of ten percentage points, on value added, of 16 percentage points, and on capital expenditure, which increased tenfold because of the program. For the first cohort in 2015, we find a positive impact/association on the probability of moving from SME to mid-cap status, which increased by more than seven points.

These results suggest that a training and coaching program for entrepreneurs, without any financial component, can produce significant effects. The orders of magnitude of our results are not on the usual scale of ex-post evaluations of business support programs. For example, the most recent evaluations of France's CICE (tax credit for competitiveness and jobs), which is, in contrast, purely financial aid without any other support, indicate a very weak effect on business levels and employment (Gilles *et al.* 2018). To our knowledge, and more generally, no study of financial aid to businesses in France indicates any impact of a comparable magnitude. Our research indicates that measures to develop the human and social capital of entrepreneurs, rather than their financial capital alone, are potentially a highly effective seam to be mined.

This recommendation must, however, be viewed from the perspective of the limits of our study. In the absence of data on the structure of corporate groups, our study was conducted at the level of the legal unit (here, the business), without considering their membership of a group of companies and the potential effects induced on the other businesses in the group and on the group more generally. Thus, accelerators could exert an influence on the growth of the group via the extensive margin with the acquisition of other legal units. It should be noted that this finding would lead us to consider our results as a lower bound of SME accelerator effects.

Our findings are based on heterogeneous observations, covering a small number of businesses and over too short a time-frame. It is clear that further evaluations of accelerators will have to be carried out in the future to confirm these initial findings. Over time, data from a growing number of accelerated businesses will become available and will allow more accurate impact assessments to be produced.

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Appendix 1. Design of a SME accelerator. The PME3 accelerator (description of the 2 years program).

2017 6 march 2017: Launch of the program	2018
<p>Launch of the 360° diagnostic</p> <p>Objectives - Identify growth issues in order to orient each SME towards the most appropriate tools best suited to their needs</p> <p>Content - Carrying out a complete panoramic diagnosis by a consultant led by the "Initiative Consulting" team of Bpifrance. This diagnosis aims to identify the stakes in terms of :</p> <p>Strategy Organization and Management Human resources Business performance Operational performance Structure & financial management Information systems Export External growth Innovation</p> <p>Process - Validation by each company of a partner consultant proposed by Bpifrance - Carrying out a 360° diagnosis: duration: 6 to 8 weeks - Proposal of the complementary modules of the Accelerator program best suited to meet the needs identified</p> <p>Schedule - Start: March 2017 - End: Q3 2017</p>	<p>Advices of a peer/Collective or individual Mentoring</p> <p>Objectives - Accompany the leaders in the growth of their company</p> <p>Content - Individual or group coaching by a volunteer peer(s) (an entrepreneur with a change of scale - from SME to ETI - or another major entrepreneurial success)</p> <p>Process - Connection with the mentoring structure: IME France (Association Française des Instituts du Entrepreneurial Mentoring), Réseau Entreprendre and WBMI (Women Business Mentoring Initiative) - Identification and proposal of a volunteer mentor - Coaching according to the terms and conditions defined between each manager and his/her mentor(s)</p> <p>Planning - Module available at the beginning of the program. The manager can activate it at his or her convenience at the moment that seems appropriate. - Accompaniment during 18 months from the constitution of the pairs</p>
<p>4 conferences of 2 days</p> <p>- March 7th: Strategy and new business models</p> <p>- March 8th: Strategic Management</p> <p>-May 3rd: Innovations</p> <p>-May 4th: Financing growth</p> <p>-September 13th: Leadership</p> <p>-September 14th: Organizational performance / Lean Management</p> <p>-November 8th: Marketing /Branding</p> <p>-November 9th: Commercial development</p>	<p>4 conferences of 2 days</p> <p>-February 21st: Governance</p> <p>-February 22nd: Advisory board</p> <p>-May 23rd: Purshasing</p> <p>-May 24th: Supply chain</p> <p>-September 12th: Recruitments</p> <p>-September 13th: Employer brand</p> <p>-November 7th and 8th: The challenges of the Midcaps of tomorrow</p>

Appendix 2. Detailed estimation results.

Table A-2a. Evaluation of the effects of Bpifrance's national SME accelerator on accelerated business cohorts from 2015 to 2017. Difference in differences estimates: full specifications.

Explained variable / Explanatory variables	Variation in the logarithm of the revenue (1)	Variation in the logarithm of the revenue (2)	Variation in the logarithm of the V.A. (1)	Variation in the logarithm of the V.A. (2)	Change in capital expenditure (1)	Change in capital expenditure (2)	Achieved mid-cap status (1)	Achieved mid-cap status (2)
Acceleration indicators:								
Falsification (effect of the accelerator if it had been introduced in 2013 in all businesses accelerated afterwards)	0.033 (0.238)	0.033 (0.237)	-0.026 (0.574)	-0.025 (0.600)	1,156.208 (0.988)	530.213 (0.994)	-0.008 (0.229)	-0.009 (0.201)
Effect of accelerators in 2017	0.098** (0.043)		0.143** (0.040)		243,971.484* (0.090)			
Effect of SME accelerators 2 and 3 in 2017		0.098** (0.042)		0.160** (0.024)		257,409.000* (0.073)		
Specific effect for PME1 in 2015							0.056 (0.154)	
Specific effect for PME1 in 2016	0.004 (0.889)		0.064 (0.302)		268,713.781 (0.386)		0.076* (0.066)	0.075* (0.069)
Specific effect for PME1 in 2017	-0.103* (0.069)		-0.348** (0.026)		-434,935.094 (0.251)		0.052 (0.213)	0.051 (0.221)
Indicators to take into account the economic situation:								
For the year 2013	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>
For the year 2014	0.002 (0.892)	0.002 (0.892)	-0.001 (0.961)	-0.001 (0.974)	37,952.609 (0.635)	37,866.012 (0.635)	-0.001 (0.594)	-0.001 (0.560)
For the year 2015	0.016 (0.279)	0.016 (0.279)	-0.020 (0.294)	-0.019 (0.301)	98,653.703 (0.176)	98,552.016 (0.176)	0.026*** (0.000)	0.029*** (0.000)
For the year 2016	-0.000 (0.994)	0.000 (0.991)	0.019 (0.284)	0.024 (0.175)	102,925.727 (0.262)	120,810.250 (0.181)	0.031*** (0.000)	0.031*** (0.000)
For the year 2017	0.017 (0.196)	0.017 (0.199)	0.005 (0.775)	-0.009 (0.630)	36,086.266 (0.679)	22,212.291 (0.800)	0.032*** (0.000)	0.032*** (0.000)
Company size (delayed by two years):								
Less than 20 employees	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>
Between 20 and 49 employees	-0.067*** (0.000)	-0.067*** (0.000)	-0.071** (0.013)	-0.070** (0.013)	4,290.846 (0.945)	2,908.919 (0.963)	2.83e-6 (0.999)	-0.001 (0.927)
Between 50 and 99 employees					21,030.793 (0.756)	21,168.971 (0.753)	0.009 (0.103)	0.009* (0.090)
Between 100 and 249 employees	-0.106*** (0.000)	-0.106*** (0.000)	-0.088*** (0.002)	-0.091*** (0.002)	-15,698.823 (0.887)	-14,553.142 (0.895)	0.060*** (0.000)	0.061*** (0.000)
Between 250 and 500 employees	-0.085** (0.038)	-0.085** (0.035)	-0.354 (0.126)	-0.377 (0.130)	-346,778.938 (0.453)	-347,608.969 (0.439)	0.734*** (0.000)	0.736*** (0.000)
Indicators of belonging to a sector of economic activity:								
Agriculture	-0.001 (0.987)	-0.001 (0.987)	0.053 (0.479)	0.051 (0.519)	-60,172.633 (0.963)	-57,041.500 (0.965)	0.037 (0.614)	0.039 (0.596)
Extractive industry	0.176* (0.051)	0.176* (0.051)	0.247*** (0.001)	0.258*** (0.001)	-55,987.645 (0.896)	-59,969.020 (0.886)	-0.024 (0.107)	(0.079)
Manufacturing industry	-0.036 (0.105)	-0.036 (0.105)	0.027 (0.418)	0.032 (0.346)	-10,929.223 (0.862)	-12,455.148 (0.826)	-0.008 (0.569)	-0.009 (0.486)
Energy	-0.115*** (0.000)	-0.115*** (0.000)	-0.021 (0.724)	-0.013 (0.825)	-298,841.219 (0.836)	-300,642.188 (0.836)	0.004 (0.794)	0.002 (0.883)
Water and waste			0.014 (0.788)	0.021 (0.691)	-212,843.313 (0.194)	-215,470.422 (0.183)	0.001 (0.970)	-0.002 (0.940)
Building / public works	-0.040 (0.111)	-0.040 (0.110)	0.006 (0.862)	0.013 (0.717)	2,981.759 (0.960)	1,028.559 (0.985)	-0.002 (0.911)	-0.004 (0.811)
Wholesale and retail trade, repair of motor vehicles and motorcycles			0.015 (0.674)	0.021 (0.571)	-26,667.211 (0.652)	-28,111.482 (0.620)	0.002 (0.909)	-0.001 (0.995)
Transport			0.004 (0.898)	0.013 (0.716)	64,837.211 (0.783)	62,101.629 (0.791)	0.008 (0.684)	0.005 (0.785)
Lodging and catering	-0.073 (0.271)	-0.073 (0.271)	-0.022 (0.793)	-0.015 (0.860)	6,978.185 (0.984)	5,458.025 (0.987)	-0.003 (0.845)	-0.005 (0.733)
Information and communication	0.044 (0.136)	0.044 (0.136)	0.072 (0.132)	0.077 (0.108)	8,101.177 (0.902)	7,305.545 (0.910)	0.009 (0.591)	0.008 (0.640)
Financial and insurance activities	-0.121*** (0.001)	-0.121*** (0.001)	-0.047 (0.414)	-0.039 (0.503)	-188,238.422 (0.388)	-189,945.188 (0.380)	-0.004 (0.782)	-0.006 (0.661)

Real estate activities	0.043 (0.461)	0.043 (0.460)	0.034 (0.823)	0.041 (0.787)	-383,061.813* (0.084)	-385,712.813* (0.081)	-0.006 (0.672)	-0.008 (0.570)
Specialized, scientific and technical activities	-0.033 (0.245)	-0.033 (0.246)	0.003 (0.938)	0.010 (0.830)	-71,127.305 (0.480)	-72,194.750 (0.473)	-0.001 (0.982)	-0.002 (0.882)
Administrative and support services activities	-0.029 (0.293)	-0.029 (0.293)	0.042 (0.339)	0.050 (0.271)	161,042.813 (0.481)	159,217.703 (0.485)	0.019 (0.344)	0.016 (0.403)
Education	-0.037 (0.684)	-0.037 (0.684)	0.064 (0.421)	0.074 (0.359)	166,087.813 (0.637)	162,626.734 (0.639)	-0.062*** (0.000)	-0.065*** (0.000)
Human health and social action	0.024 (0.795)	0.024 (0.794)	0.121 (0.266)	0.132 (0.226)	388,129.063 (0.385)	386,823.250 (0.383)	-0.060*** (0.000)	-0.063*** (0.000)
Arts, entertainment and recreation	0.101 (0.153)	0.101 (0.152)	0.335* (0.091)	0.346* (0.085)	-365,724.719 (0.747)	-368,581.094 (0.746)	0.105 (0.148)	0.102 (0.158)
Other services activities	0.043 (0.345)	0.043 (0.344)	0.126*** (0.004)	0.135*** (0.005)	-257,101.063 (0.575)	-258,574.813 (0.566)	-0.013 (0.342)	-0.012 (0.255)
<u>Ratios characterizing the economic situation of companies:</u>								
<i>Levels (delayed by two years):</i>								
Margin rate	-0.000 (0.935)	-0.000 (0.934)	0.003 (0.631)	0.003 (0.633)	7,208.048 (0.489)	7,184.389 (0.489)	0.000 (0.810)	0.000 (0.581)
Capital intensity	0.000* (0.068)	0.000* (0.067)	0.000* (0.054)	0.000* (0.054)	0.256 (0.112)	0.257 (0.111)	-1.27e-8** (0.030)	-1.29e-8** (0.028)
Apparent work productivity	-0.000*** (0.009)	-0.000*** (0.009)	-0.000*** (0.037)	-0.000*** (0.038)	0.130 (0.624)	0.128 (0.628)	3.83e-8* (0.079)	3.86e-8* (0.077)
Economic profitability	0.000 (0.973)	0.000 (0.973)	0.004** (0.017)	0.004** (0.017)	-1,097.644 (0.373)	-1,110.060 (0.370)	0.000 (0.337)	0.000 (0.341)
Percentage of revenue generated from exports	0.009 (0.719)	0.009 (0.719)	0.017 (0.580)	0.016 (0.593)	57,990.156 (0.472)	59,127.352 (0.465)	-0.002 (0.819)	-0.002 (0.867)
<i>Variations (delayed by two years):</i>								
- of the margin rate	0.000 (0.921)	0.000 (0.921)	-0.003 (0.551)	-0.003 (0.552)	-13,088.676 (0.141)	-13,070.598 (0.140)	0.000 (0.771)	0.000 (0.731)
- capital intensity	-0.000 (0.617)	-0.000 (0.615)	-0.000 (0.296)	-0.000 (0.289)	-1.222 (0.182)	-1.227 (0.180)	1.36e-8 (0.151)	1.51e-8 (0.111)
- apparent labor productivity	0.000 (0.377)	0.000 (0.377)	-0.000 (0.922)	-0.000 (0.911)	0.448 (0.335)	0.451 (0.332)	-1.35e-8 (0.405)	-1.56e-8 (0.336)
- economic profitability	0.001 (0.192)	0.001 (0.191)	0.001 (0.278)	0.001 (0.271)	1,558.711 (0.242)	1,585.940 (0.235)	1.56e-6 (0.981)	1.07e-6 (0.988)
- of the share of revenue generated from exports	0.002 (0.934)	0.002 (0.934)	0.039* (0.066)	0.039* (0.065)	42,039.352 (0.428)	42,539.305 (0.424)	-0.008 (0.264)	-0.008 (0.275)
Intercept	0.161*** (0.000)	0.161*** (0.000)	0.100** (0.034)	0.094* (0.053)	-35,009.504 (0.690)	-33,398.578 (0.696)	-0.018 (0.185)	-0.016 (0.217)
Number of observations (businesses*years)	4,036	4,036	3,935	3,935	4,034	4,034	4,062	4,062
Coefficient of determination (R2)	0.033	0.033	0.031	0.027	0.015	0.015	0.206	0.205
Fisher's statistic of overall significance	3.060	3.212	2.384	2.290	0.636	0.652	6.777	6.947

Sources: Bpifrance and ALTARES data.

Scope: 885 Excellence member companies, 142 of which participated in Bpifrance's national SME accelerator between 2015 and 2017.

Notes: For each variable, the coefficient and the associated critical probability are provided (the smallest probability for which the coefficient is considered to be statistically significantly different from 0). (1) Unconstrained model (equation (3)); (2) Constrained model (equation (3) with only the most significant coefficients). Significance: *** (or ** or *) refers to a coefficient significantly different from 0 to 1% (or 5% or 10% respectively).

Table A-2b. Evaluation of the effects of Bpifrance's national SME accelerator on accelerated business cohorts from 2015 to 2017. Triple difference estimates: full specifications.

Explanatory variables / Explained variable	Variation in logarithm of revenue	Variation in the logarithm of V.A.	Change in capital expenditures
<u>Acceleration indicators:</u>			
Falsification (effect of the accelerator if it had been introduced in 2013 in all businesses accelerated afterwards)	0.035 (0.245)	0.004 (0.947)	-39,939.539 (0.652)
Effect of SME accelerators 2 and 3 in 2017	0.059 (0.174)	0.159** (0.028)	297,496.438* (0.077)
<u>Indicators to take into account the economic situation:</u>			
For the year 2013	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>
For the year 2014	0.002 (0.889)	-0.003 (0.881)	27,199.318 (0.737)
For the year 2015	0.018 (0.216)	-0.016 (0.385)	86,775.555 (0.294)
For the year 2016	-0.001 (0.948)	0.028 (0.137)	102,382.641 (0.287)
For the year 2017	0.022 (0.111)	-0.006 (0.740)	-2,638.086 (0.970)
<u>Company's workforce (delayed by two years):</u>			
Less than 20 employees	<i>Benchmark</i>	<i>Benchmark</i>	<i>Benchmark</i>
Between 20 and 49 employees	-0.087** (0.011)	-0.118** (0.042)	-151,357.875* (0.084)
Between 50 and 99 employees	-0.161*** (0.000)	 (0.004)	-221,284.156 (0.186)
Between 100 and 249 employees	-0.236*** (0.000)	-0.224*** (0.005)	-315,277.938 (0.116)
Between 250 and 500 employees	-0.275*** (0.000)	-0.502*** (0.006)	-992,830.000 (0.220)
<u>Ratios characterizing the economic situation of companies:</u>			
<u>Levels (delayed by two years):</u>			
Margin rate	-0.002 (0.480)	-0.001 (0.818)	8,916.492 (0.324)
Capital intensity	0.000 (0.291)	0.000 (0.125)	1.769 (0.144)
Apparent work productivity	-0.000 (0.180)	-0.000 (0.132)	-0.857 (0.156)
Economic profitability	0.001 (0.649)	0.009 (0.114)	-654.813 (0.605)
Percentage of revenue generated from exports	0.006 (0.927)	0.031 (0.637)	41,579.656 (0.711)
<u>Variations (delayed by two years):</u>			
- of the margin rate	0.001 (0.635)	-0.001 (0.832)	-14,969.396 (0.162)
- capital intensity	0.000 (0.871)	-0.000 (0.882)	-2,053** (0.023)
- apparent labor productivity	-0.000 (0.358)	-0.000 (0.254)	0.772* (0.055)
- economic profitability	0.001 (0.197)	0.001 (0.339)	1,065.949 (0.403)
- of the share of revenue generated from exports	-0.009 (0.731)	0.033* (0.074)	66,625.602 (0.477)
Intercept	0.184*** (0.000)	0.186*** (0.001)	74,265.000 (0.663)
Number of observations (businesses*years)	4,036	3,935	4,034
Coefficient of determination (R2)	0.016	0.024	0.022
Fisher's statistic of overall significance	1.935	1.609	1.072

Sources: Bpifrance and ALTARES data.

Scope: 885 Excellence member businesses, 142 of which participated in Bpifrance's national SME accelerator between 2015 and 2017.

Notes: For each variable, the coefficient and the associated critical probability are provided (the smallest probability for which the coefficient is considered to be statistically significantly different from 0). Significance: *** (or ** or *) refers to a coefficient that is significantly different from 0 to 1% (or 5% or 10% respectively).

Appendix 3. Definition of company statuses.

Table A-3. Definition of company statuses.

SME	Mid-cap	Large business
(Employees <250) And (Revenue <€50m or balance sheet total <€43m)	[(250 <=number of employees <=4,999) And (Revenue <=€1,500m or balance sheet total <=€2,000m)] or [(Employees <250) And (Revenue >=€50m and balance sheet total >=€43m)]	(Number of employees >=5,000) Or (Revenue >€1,500m and balance sheet total >€2,000m)

Source: INSEE nomenclature.