WORKING PAPER

N° 2021-6

THE EFFECTS OF THE NON-FINANCIAL COMPONENT OF BUSINESS ACCELERATORS

FABRICE GILLES, YANNICK L'HORTY, FERHAT MIHOUBI

www.tepp.eu

TEPP – Theory and Evaluation of Public Policies - FR CNRS 2042

The Effects of the Non-Financial Component of Business Accelerators

Fabrice Gilles[1], Yannick L'Horty[2], Ferhat Mihoubi [3]
February 2021

Abstract. *Accelerators are selective, intensive programs to help business owners, usually grouped into cohorts, develop the growth potential of their businesses. They appeared first in the mid-2000s in the United States and have since spread throughout the world. In France, the accelerator program implemented by Bpifrance since 2015 follows this same pattern, while having 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. 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 set of businesses presenting the same characteristics that did not participate in the program. For the first cohort, we find a significant impact on the likelihood of growing in size from an SME to a mid-cap enterprise. 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

This work has benefited from the support and follow-up of Bpifrance and in particular contributions from Matthieu Brun, Mathilde Le and Baptiste Thornary. We would like to thank the participants of the VI th AFSE-DG Trésor conference on the evaluation of public policies (December 10, 2020) for their comments.

[1] University of Lille, LEM-CNRS (UMR 9221) and TEPP-CNRS (FR 2042), fabrice.gilles@univ-lille.fr.
[2] University Gustave Eiffel, ERUDITE (EA 437), UPEC, UPEM, and TEPP-CNRS (FR 2042), yannick.lhorty@univ-eiffel.fr.
[3] University Paris-Est Créteil, ERUDITE (EA 437), UPEC, UPEM, and TEPP-CNRS (FR 2042), ferhat.mihoubi@u-pec.fr.

1. Introduction

Since their appearance in the mid-2000s, accelerators[4] have been the subject of a growing volume of research. Three reviews of the literature have already 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 most recent comprehensive review, by Crisan *et al.* (2019), includes 98 academic articles published on this topic over the last 15 years. This vast literature is essentially qualitative. Relatively little work has been done to statistically measure the impact of participating in an accelerator on accelerated businesses, and no studies have been conducted in France. In addition, while a large part of the literature indicates positive effects from acceleration, it does not always distinguish the mechanisms producing these effects. However, a substantial body of studies indicates that access to financial capital appears less important for businesses than access to entrepreneurial capital (Kerr et al., , 2014; Gonzalez-Uribe and Leatherbee, 2018).

In France, the government has given significant support to the development of accelerator programs since the summer of 2014, under the aegis of Arnaud Montebourg, Minister of the Economy, Productive Recovery and Digital Affairs, who declared "we are going to select a French national team of SMEs[5], (...) We are preparing the CAC 40[6] of the future". This program is run by Bpifrance, the public investment bank created in 2012 with the objective of developing SMEs. The program plays a central role in its strategy for business development, and Bruno Le Maire, Minister of Economy and Finance, called for its expansion as part of the *French Fab*[7]*,* launched on October 2, 2017. "I am setting the goal of 4,000 companies passing through accelerators inside four years and we will give Bpifrance the resources to achieve it," said the Minister in a speech given at the launch ceremony for the first intake for the Ambition PME-ETI (SME and mid-cap) accelerator, targeting the aeronautics industry and formed with the *Groupement des Industries de l'Aéronautique et de l'Espace* (Gifas).

Bpifrance's accelerator offers an outstanding opportunity to evaluate the specific effects of the non-financial component of support. It includes all the usual dimensions of accelerators, with management training, networking and advice, but no financial aid or equity investments.

[4] Also called seeds programs, for Small Enterprise Education and Development, in the literature.
[5] Small and Medium Enterprises.
[6] The index of top forty capitalizations on the Paris stock exchange, France's leading stock market index.
[7] *La French Fab* is a collective brand that aims to promote the French manufacturing sector.

By assessing this program's impact on business growth and employment, we can quantify the specific contribution of the non-financial component of accelerators. In doing so, we believe that we provide a useful complement to both the accelerator literature, which struggles to identify the specific contributions from financial and non-financial support, and the literature on business support, which focuses primarily on direct financial support and tax expenditures.

While it does not involve financial investment, Bpifrance's program is similar to an investment in human capital (through the training and access to consultancy that it entails) and in social capital (through business owners' networking and participation in events). It is intensive and lasts 24 months. Both a label effect and an effect via the organizational transformation of the company are expected.

Our aim is to evaluate the causal impact of this program on the development of accelerated businesses. One of the difficulties of this evaluation is that a great deal of selection is involved before businesses are accelerated, on both observable criteria (size of the company, volume of revenue, business growth, etc.) and unobservable criteria (business owner's ambition, attentiveness, availability, etc.). It is important to distinguish between the effect of the accelerator itself and the effect of this selection, which entails building a counterfactual group of non-accelerated businesses with the same characteristics as those that have been accelerated.

The impact assessment uses a micro-econometric method of ex-post evaluation that allows us to compare the first three cohorts of businesses accelerated by Bpifrance with cohorts of non-accelerated businesses having characteristics comparable to those of the accelerated businesses before selection. The approach is based on quasi-experimental evaluation, using differences-in-differences estimators (Ashenfelter and Card, 1985), this being a field where it is very difficult to carry out purely experimental evaluations given the specific features of business development support programs, which are both highly selective and not particularly standardized (Dalziel, 2018). We find that non financial accelerators provided by Bpifrance significantly increase sales, value added and investment.

The first section describes the history and features of accelerators. The second section presents the different types of accelerator. The third section presents an overview of the impact assessments carried out on accelerators. The fourth section presents the statistical

data used. The fifth section explains how accelerator effects were identified. The final section comments on the results.

2. What accelerators are

Accelerators, or seed accelerator programs, are themselves an innovation in the landscape of business development 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, they do not necessarily target new micro-enterprises and do not focus on providing a hosting environment conducive to business development. Neither are they integrated service platforms designed to foster innovation by linking scientific and industrial communities in a given area, using the idea of an ecosystem, like the Connect program initiated in San Diego in 1984 (Walshok, 2013), or the notion of competitiveness clusters used in France.

Three families of programs

Instead, accelerators are more akin to "boot camps" of a fixed duration, within which a cohort of executives from existing businesses receive training and mentoring. These camps vary in intensity and duration, but generally last from three to six months. Different categories of accelerators can be distinguished depending on the goals pursued. Clarysse et al. (2015) propose a distinction between investor-led accelerators, ecosystem accelerators and matchmaker accelerators. These three categories of program differ in terms of the status of those running them, the goals they pursue, and their content.The first type of accelerators called "Investor-led accelerators" focus on return on investment and conclude with public events, or Demo Days, during which the cohort of business owners present their companies to a panel of potential investors (Hochberg, 2016). The first such accelerator, Y Combinator, was founded in 2005 in Silicon Valley. Techstars followed in 2007 in Boulder, Colorado, and spun off into franchises to become one of the largest programs. The first European accelerator, Seedcamp, was launched in 2007 in London. Another European example is the Axel Springer Plug and Play Accelerator created in 2013 following the merger of Axel Springer SE, one of the European champions in media and digital businesses, and Plug and Play Tech Center, a long-standing incubator based in California.

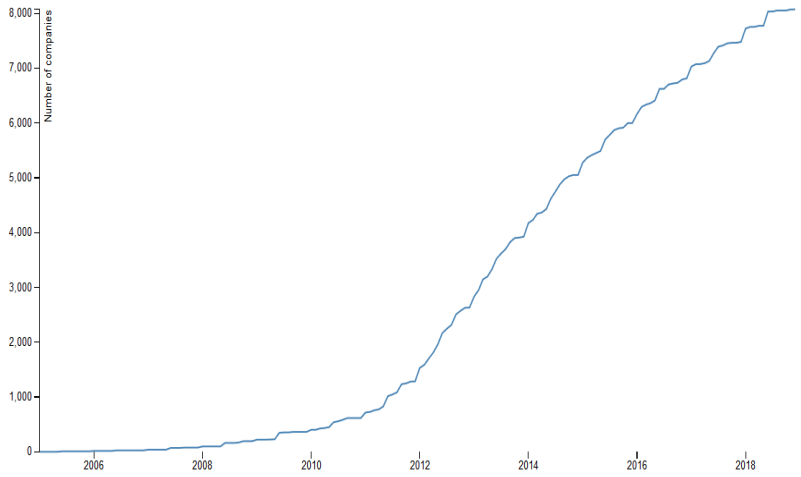
The second type of accelerator aims to create a local business ecosystem. This type of program has a regional focus and is led mainly by national and local government bodies responsible for regional development. The aim is to promote the emergence locally of a business fabric that usually also targets a given field or sector of economic activity. Examples of this category of accelerator are Village Capital created in 2009 in Washington, D.C., which seeks to develop local communities of entrepreneurs, and Parallel18, which accelerates start-ups in Puerto Rico.

The third type is run by a large company, a bank or a particular industry and aims to develop dovetailing areas to bring new services to their own customers. The management of large companies and/or their directors are usually involved to a great extent. They focus on networking of accelerated businesses with a new clientele. An example is the FinTech Innovation Lab, a twelve-week program developed in New York by Accenture which is also active in Hong Kong and London.

Continuous expansion

There are now more than 3,000 accelerators worldwide and this number is growing rapidly (Cohen 2013; Cohen and Hochberg 2014). The Seed-DB site lists only accelerators run by investors in which the investors invest directly in companies. As of December 2020, there were a total of 190 active accelerator programs worldwide that have accelerated 8,000 businesses costing a total of $80 billion in funding. This expansion occurred in the 2010s (Figure 1).

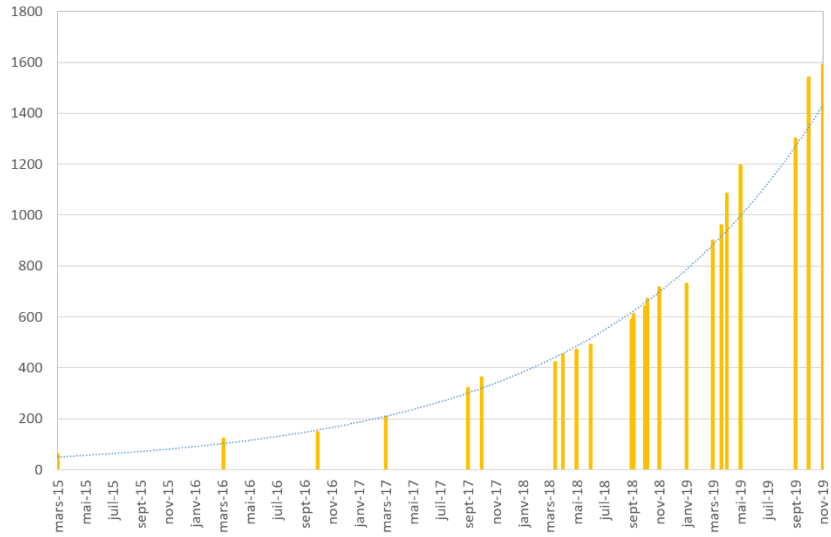
Figure 1. Number of accelerated firms (worldwide)



Source: database of accelerator programs [(www.seed-db.com).](http://www.seed-db.com)

Bpifrance's accelerator programs are comparable to the second and third types in Clarysse's *et al.* categorization (2015). They are led by a public-sector body and consist of a selective program combining business consulting activities, training of management teams, and networking, all undertaken within a group or cohort. The first cohort of accelerated businesses (PME1[8]) entered the program in March 2015 and left in March 2017. The following cohorts (PME2, ETI1[9]) began their acceleration in 2016. The third cohort of SME businesses (PME3) started the program in March 2017. The first programs acted as incubators for the subsequent versions of the scheme. After targeting medium-sized and intermediate businesses identified for their strong growth potential, more recent generations of accelerator programs have been developed with a regional or sector focus. They all aim to achieve performance objectives. Expansion is exponential (Figure 2). At the end of 2019, there were more than 50 accelerator cohorts and more than 1,500 businesses accelerated by Bpifrance.

Figure 2. Number of accelerated businesses (Bpifrance)



Source: Bpifrance

[8] PME1 is the first cohort of SME accelerators. PME2 and PME3 are the following cohorts of SME accelerators.
[9] ETI1 is the first mid-caps accelerator.

3. What accelerators do

The literature on accelerators 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. As there is a wide variety of programs, it is useful to distinguish their various components to analyze the channels through which accelerators actively deliver business growth.

A small number of ingredients

In one of the first studies on the subject, Miller and Bound (2011) point out that the accelerator model is based on combining a small number of ingredients found in varying proportions in all programs. They highlight five main characteristics that appear to make accelerators unique relative to other business support programs.

1) Even if they are selective, access to accelerators is open to all businesses that can apply;
2) Participating businesses may have access to financing facilities, in the form of a pre-seed investment, sometimes in exchange for equity;
3) 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;
4) The accelerator consists of a time-limited support program that blends scheduled events and intensive coaching;
5) The program is organized on the basis of cohorts or "classes" of start-ups rather than purely individual monitoring of participating businesses.

It is interesting to note that this list of ingredients includes a financial component (in point 2), although it will not necessarily form part of the package of actions offered by all accelerator programs. Accelerators thus include both financial and non-financial components. The main purpose of the latter 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). 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).

One of the drivers is found in the entrepreneurial capital of companies, i.e. the set of skills and resources needed for businesses to get off the ground and grow. This type of capital combines non-financial elements in the human and social capital of the business owner and the management team, and potentially financial elements that take the form of preferential access to equity and non-equity financing. The non-financial component includes the individual capacity of business owners to seize business development opportunities, the reputation of the business which helps attract employees, investors and customers, and access to a network of entrepreneurs. The latter has long been considered in the managerial literature to be a positive influence on business performance (Mokry, 1988; Larson, 1991). Another objective of management training is to maintain the passion for entrepreneurship and the entrepreneurial spirit that is supposed to produce positive effects on business and value creation (Gielnik *et al*., 2017).

To expand this entrepreneurial capital, accelerator programs typically include formal education, in the form of workshops or seminars on entrepreneurship. They also include an advisory component, such as access to business mentors and networking opportunities (Cohen and Hochberg, 2014). Accelerators can thus increase the entrepreneurial capital of business owners while confirming their entrepreneurial quality.

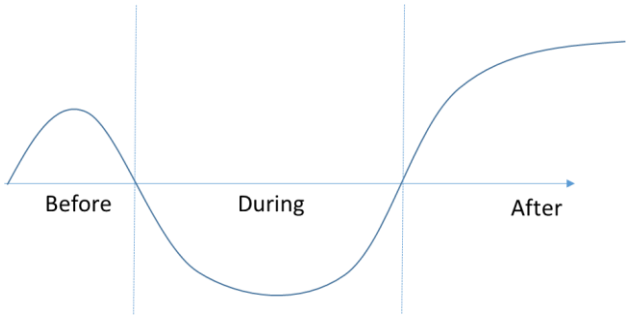
The Bpifrance accelerator and its expected effects

Bpifrance's accelerator follows the same philosophy. It combines three areas of involvement, stemming from Bpifrance's business lines: 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). These activities are coordinated to operate in a collective approach over a period of 12 to 24 months. They are similar to a management training program. Differences exist between versions of the program and between types of accelerator, in terms of both organization and goals, but the common foundation is clear. Bpifrance's accelerator is a non-financial, high-intensity support system, based on a clearly defined route. The economic reasoning is that of investment in human and

social capital. It is not just a label, since these efforts result in a real organizational transformation of the business.

The abundant literature on the evaluation of education and training schemes can serve to study the expected effects of such a program. The most recent overview by Card *et al.* (2018) analyses the results of 207 studies on active labor market policies, half of which relate to training. It shows that, in comparison with other programs, the effects of training on the population of job seekers are relatively limited in the short term but take on greater significance in the medium and long term. This literature suggests that the employment impact of a training program differs depending on the time horizon. Figure 3 summarizes the expected effects before, during and after the training period. Before training, if access to training is selective, it produces a positive signal and recognition effect. During training, the dominant mechanism is a lock-in effect. The trainee is, as it were, locked into the training, which limits the time spent on other activities (including job search) and reduces his or her performance. After the training period, the effect is indeterminate and depends on the effectiveness of the training and its ability to improve the human capital of the trainees.

Figure 3. Expected effects of taking training.



This general conclusion does not automatically apply to accelerators. In the case of the Bpifrance program, the “treatment” is both long and relatively intensive, but has the potential to produce beneficial effects quite quickly: organizational transformation can begin as early as the first week. Owners and managers in accelerated businesses “absorb” doses of treatment as soon as they enter the program, and it can have an immediate and lasting signal effect. Questions around the existence and duration of the signal effect, the lock-in effect and the accelerator effect are therefore open-ended and can be answered only empirically.

4. What the (few) impact evaluations report

In their systematic review of the literature, Crisan *et al.* (2019) indicate that of the 83 published empirical studies on accelerators, 61 use only qualitative approaches based on interviews and just 15 use a quantitative approach, while seven studies are mixed. Of these studies, there are very few rigorous evaluations of the impact of accelerator effects using advanced methods to assess public policy. Note that this was also the case for the abundant literature on incubators, in which, again, very few impact evaluations were conducted (Hackett and Ditts, 2004). 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.

Matching methods

One idea for controlling selection bias linked to joining the incubator in the first place is to construct *ex post* a control group using a matching method, such as the propensity score (the conditional probability that a business will join an incubator) proposed by Rosenbaum and Rubin (1983). This is, for example, the identification strategy adopted by Stokan et al. (2015) applied to American companies. In 2009, these authors obtained responses to a telephone survey from 294 incubated businesses, identified by the National Business Incubation Association (NBIA), and 395 non-incubated businesses, which were considered a representative sample of U.S. businesses. The analysis reveals positive employment effects for incubated businesses, which reportedly created 58% more jobs than non-incubated businesses.

The same type of approach was adopted by Hallen *et al.* (2017) on data 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 use the coarsened exact matching method developed by Iacus et al. (2012) to 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. The authors 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 when they considered the data taken as a whole. 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.

This work therefore concludes that there are positive effects from participating in an accelerator, without actually distinguishing the precise mechanisms by which these effects are obtained. In particular, it is not known whether it is purely the financial aspect of the accelerator that has an effect, or whether the predominant effect comes from support and training for managers. The samples of businesses, mainly from Crunchbase, are often too small to be able to draw any conclusions.

Yu's work (2019) also uses matching methods but allows deeper interpretation. The 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. One original aspect is that the matching is not carried out by an automatic algorithm. It is 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 interpretation is that the support offered by the accelerator provides more information on the viability of the business to business founders, 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.

One common limitation shown by these different studies is that they do not take into account selection biases based on unobservables. Smith and Hannigan (2015) use the two-step approach proposed by Heckman. They first estimate a selection model of the decision to enter an accelerator. Then they use the fact that the business owner has higher education in computer science as an instrument for the firm to be accelerated. Their approach directly questions the effect of financing obtained through an accelerator by comparing it to that obtained by a business angel (BA) investor. Do the two sources of financing make a difference

to the chances of the company being acquired by another, to its risk of failure and to its access to other venture capital financing? The authors constructed a sample of 619 Y Combinator and Techstars accelerated businesses covering the period 2005-2011, which they compared to a sample of equivalent businesses in which BAs invested. They used an exact match by group like Hallen, Bingham, and Cohen (2017). Like Yu (2019), they found a positive effect from acceleration on the discontinuation of businesses, from a combination of two effects: a positive impact on the chances of being bought out by another firm and also an increased likelihood of the planned business being abandoned. In addition, while acceleration opens up greater access to external financing in the short term, especially if there is a Demo Day, it restricts access to venture capital financing in the longer term in comparison with BA-financed companies.

Discontinuity regressions

A second set of work uses discontinuity regression methods. For example, Kerr *et al.* (2014) examine the effects of business angel financing on the growth of the businesses financed, using data from two large groups of investors (Tech Coast Angels and CommonAngels) over the period 2001-2006. These figures, which cover 2,500 companies, allow for a comparison between financed businesses and others that were not financed, but that were evaluated in the same way and whose quality in terms of their application almost qualified them for financing. By exploiting these discontinuities in the behavior of financiers, the authors found that the businesses selected by investors had a 20% to 25% higher probability of survival four years after their financing, that they had between 16 and 20 more employees than the others in 2010, and that they had access to a greater variety of financing sources. However, there are few initial differences in the financing obtained by the two groups of businesses, suggesting that the differences ultimately seen are due less to the financing itself than to the effects of the support and advice provided by the investors. This conclusion is consistent with Bruhn *et al.* (2010), who found that access to advisory services and entrepreneurial capital (the owner's ability to manage his business well) is often lacking for many businesses and is ultimately more important than access to financial capital.

The evaluation of the Chilean program, Start-Up Chile, also falls into this category (Gonzalez-Uribe and Leatherbee, 2018). This is a country-wide development program, rather than one

aimed at new, high-growth companies. Like many other geographical accelerators, Start-Up Chile offers its participants 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 an additional 21 per cent in financing, which corresponds to an increase of 0.29 standard deviation points from the sample average. In addition, the entrepreneurship school resulted in a tripling of the amount of capital invested, corresponding to an unconditional average increase from $37,000 to $112,000, an increase of 0.30 standard deviations from the mean. It also resulted in a doubling of the number of employees, helping companies move from an unconditional mean of 0.9 to 1.8 employees. However, the authors do not highlight a specific effect of this access to financing and a workspace on the funds raised, on the size of the workforce or on the risk of business failure.

5. The Bpifrance accelerator: descriptive statistics

Our study focuses solely on Bpifrance's 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 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, equating to holding company activities. In the absence of consolidated financial statements, we decided not to include them. In addition, the sample also included accelerated companies linked to investment 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.

Table 1. Sample of accelerated businesses.

	Date of entry	Exit date	Number of businesses	Number excluding parent companies and investment funds	Final number
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.

It is important to note 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 profit and net earnings. 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 impact, i.e. 2018). The businesses in PME1 had revenue of nearly €25 million, gross operating surplus of €1.8 million and net earnings of nearly €900,000 with 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.

All three accelerator cohorts show obvious positive effects, which appear to be more pronounced for PME2 and PME3 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% for PME1 and 26% and 36% respectively for the next two cohorts. The average increases in gross operating profit and net earnings are more variable and show contrasting values from cohort to cohort.

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

		T-1	T+2*	Change over 3 years
PME1	Revenue	24774454	30184314	22%
	Staff	118	132	12%
	OP	1818372	2028807	12%
	Net	895158	641194	-28%
PME2	Revenue	20572780	30836684	50%
	Staff	97	122	26%
	OP	1036064	2601656	151%
	Net	513799	1313825	156%
PME3	Revenue	15493089	23176045	50%
	Staff	66	90	36%
	OP	1009379	961090	-5%
	Net	749658	555089	-26%
3 cohorts	Revenue	20903865	33709092	61%
	Staff	97.4	129	33%
	OP	1335518	2028807	52%
	Net	724168.9	830910	15%

Sources: Bpifrance and ALTARES data.
Scope: 142 companies participating in Bpifrance's national SME accelerator between 2015 and 2017.
Notes: *Second year of treatment (T+1) for PME3.

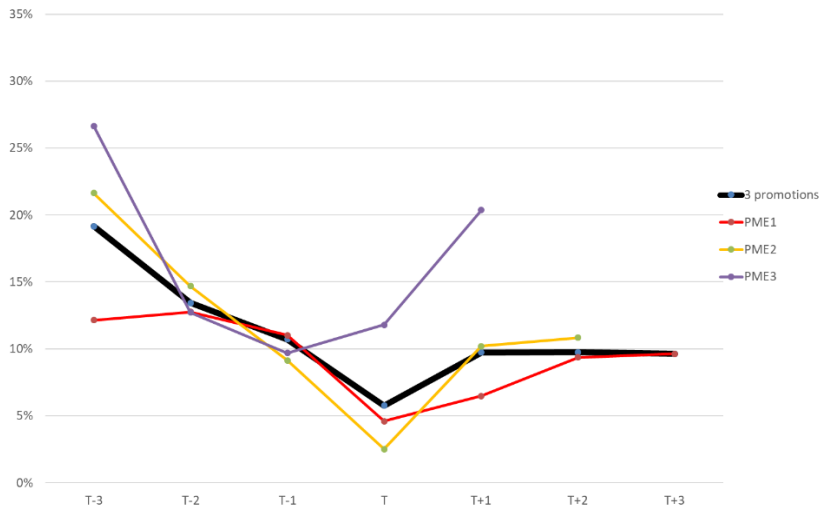
For each of the cohorts, only a small number of observations are available and the figures are thus quite sensitive to the presence or absence of a particular business, the nature of the metrics and outlier values. We illustrate this sensitivity in Figure 4, which shows the changes in revenue for the 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.

The point of most interest is the general profile of the graph, which show a more or less flattened V-shape for all indicators, centered on the first year of the program, T. The graph could be viewed as a stylized version of the theoretical profile in Figure 3. The left-hand side of the V could be interpreted as a selection effect: businesses selected to enter the accelerator

were selected because they have strong revenue growth. The low point in T could be interpreted as a lock-in effect: businesses entering the accelerator are reorganizing, and the first effect of this reorganization might be slower sales growth. The right branch of the V corresponds to the acceleration effect and suggests a positive effect from the program.

The accelerator effect seems greater the more recent the cohort. The accelerator effect seems indeed more pronounced for PME3 than for PME2 or PME1. Note that this effect may be due at least in part to changes in the type of accelerated businesses, which are smaller in the most recent cohorts. The scale of the least positive effect is around a two percentage points increase in revenue after acceleration.

Figure 4: Sales growth, before, during and after accelerator entry.



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 5, 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 lock-in[10] effect. Graphs for changes

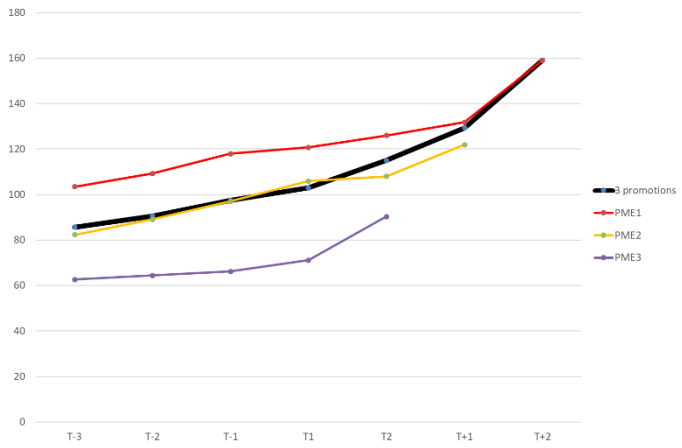
[10] Revenue and added value therefore show a stronger lock-in effect than employment. Two explanations can be put forward:

-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.

in value added, export sales, net earnings and gross operating profit show very erratic patterns.

Figure 5: Size of labor force before, during, and after entering the accelerator.



Source: Bpifrance and ALTARES data.

6. Identifying the effects of the accelerator

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 businesses. 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.

Construction of the control group

We have chosen to form the benchmark group of businesses from companies with the "Excellence" label, which is an internal Bpifrance label designating companies that are Bpifrance clients with high credit scores. 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 investment 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. 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). In 2014, one year before the first SME acceleration scheme was implemented, there are differences in the levels of the net earnings between the accelerated and the other businesses (non-accelerated "Excellence" businesses): the levels of revenue and added value are higher in accelerated businesses in PME1. On the other hand, there is no difference in the growth rates in revenue and added value 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		
	PME1 (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)**
$\Delta \log turnover$	9.3%	7.1%	**2.1pp**	5.7%	7.8%	**-2.1pp**	9.7%	4.9%	**4.8pp**
$\Delta \log va$	15%	6.2%	**8.8pp**	4.2%	4.1%	**0.1pp**	9.4%	6.6%	**2.8pp**
$\Delta Invest.$	€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	**€0.3 m**
Value added	€7.6m	€4.6m	**€2.9m*** **	€5.1m	€4.7m	**€0.4m**	€5.7m	€4.9m	**€0.8m**
Investment	€732k	€760k	**€28k**	€938k	€762k	**€175k**	€598k	€892k	**-€293k**
Gross operating profit	€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. The results suggest 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)**
$\Delta \log turnover$	5.5%	7.0%	**-1.4pp**	8.8%	6.4%	**2.4pp**	17.0%	7.5%	**9.5pp****
Δlva	-1.6%	5.5%	**-7.1pp**	10.2	5.9%	**4.4pp**	17.9%	5.0%	**12.8pp***
$\Delta Invest.$	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.

Econometric specifications

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 2). 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 brackets of workforce size, the economic sector at an intermediate level (broken down into 21 sectors), 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 variation, time dummy variables for each year are added to the model.

$$\begin{aligned}\Delta y_{i,t} = \beta_0 + \beta_1 . I_{\text{i}\in\text{treated,2013}} + \sum_{t_1=2015}^{2017} \beta_{2,t_1} . I_{\text{i}\in\text{treated,t}_1} + \sum_{e=1}^{4} \gamma_e . \text{employment\_size}_{\text{i}\in e,\text{t-2}} + \sum_{s=1}^{18} \theta_s . \text{sector}_{\text{i}\in s,\text{t}} + \\ \tau_1 . \text{margin\_rate}_{\text{i,t-2}} + \tau_2 . \text{eco\_r\_rate}_{\text{i,t-2}} + \tau_3 . \text{cap\_intens}_{\text{i,t-2}} + \tau_4 . \text{share\_turnover\_exported}_{\text{i,t-2}} + \\ \delta_1 . \Delta\text{margin\_rate}_{\text{i,t-2}} + \delta_2 . \Delta\text{eco\_r\_rate}_{\text{i,t-2}} + \delta_3 . \Delta\text{cap\_intens}_{\text{i,t-2}} + \delta_4 . \Delta\text{share\_turnover\_exported}_{\text{i,t-2}} + u_{i,t}\end{aligned} \quad (1)$$

where:

- $\Delta y_{i,t}$ the variation in the result variable (as a value or logarithm).

- A dummy variable equal to one when business *i* belongs to the accelerated group ("treated") at date *t* and 0 otherwise $I_{\text{i}\in\text{treated,t}}$.

- $\text{employment\_size}_{\text{i}\in e,\text{t-2}}$ a dummy variable equal to one if the salaried workforce of business *i* belongs to bracket *e* at date *t-2*.

- $\text{sector}_{\text{i}\in s,\text{t}}$ a dummy variable equal to one if business *i* belongs to sector *s* at date *t*.

- margin_rate, eco_r_rate, cap_intens and share_revenue_exported correspond to the margin rate, the economic rate of return, the capital intensity and the share of revenue from exports.

To ensure that any effect detected is not an artifact related to the presence of separate trends between businesses in the accelerated ("treated") group and those in the control group, we added a variable to the model that allows a falsification (or placebo) test to be performed. The

aim is to test the effect of an SME accelerator if it had been set up in 2013[11], which is earlier than the actual implementation date of the first accelerator (2015). In other words, we tested the impact of an accelerator when in fact there was none. If the two groups, accelerated and control, show common trends, no impact should be obtained from the dummy accelerator in 2013. If, on the other hand, there is a significant effect from this dummy accelerator, it indicates that the two groups show distinct trends as regards performance variables. In this case, it is useful to estimate a diff- in-diff-in-diff model (equation 2)**.** A business-specific trend is then captured by introducing a fixed business effect (ν_i) into the growth rate for the performance variable. In addition, the sector dummy variable disappears under the diffin-diff-in-diff model. The estimated equation stand as follows:

$$\Delta y_{i,t} = \beta_0 + \beta_1.I_{\text{i}\in\text{treated},2013} + \sum_{t_1=2015}^{2017} \beta_{2,t_1}.I_{\text{i}\in\text{treated},t_1} + \sum_{e=1}^{4} \gamma_e.\text{employment\_size}_{\text{i}\in e,\text{t-2}} + \sum_{s=1}^{18} \theta_s.\text{sector}_{\text{i}\in s,\text{t}} +$$
$$\tau_1.\text{margin\_rate}_{\text{i,t-2}} + \tau_2.\text{eco\_r\_rate}_{\text{i,t-2}} + \tau_3.\text{cap\_intens}_{\text{i,t-2}} + \tau_4.\text{share\_turnover\_exported}_{\text{i,t-2}} +$$
$$\delta_1.\Delta\text{margin\_rate}_{\text{i,t-2}} + \delta_2.\Delta\text{eco\_r\_rate}_{\text{i,t-2}} + \delta_3.\Delta\text{cap\_intens}_{\text{i,t-2}} + \delta_4.\Delta\text{share\_turnover\_exported}_{\text{i,t-2}} + \nu_i + \varepsilon_{i,t}$$

(2)

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 positive effects on performance variables from the point a business enters an accelerator. Examination of Figure 4 suggests positive effects from acceleration on revenue in 2016 and 2017 for PME1, i.e. one to two years after the date of entry into the accelerator. On the other hand, for PME2, the effect is seen as early as 2017, i.e. one year after the accelerator entry date, and is of greater magnitude. Finally, for PME3, the effect shows in 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

[11] To carry out these falsification tests, we preferred to use 2013 rather than 2014. Bpifrance's publicity around accelerators was substantially greater in 2014. It cannot therefore be ruled out that companies in the "Excellence" group may have anticipated these accelerators and changed their behavior as early as 2014. We have therefore chosen 2013, where any such anticipation effect is expected.

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 advice 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 4) 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. Therefore, the final form used to make our difference in differences assessment is as follows:

$$\begin{aligned}\Delta y_{i,t} = {} & \beta_0 + \beta_1.I_{\text{i}\in\text{treated,2013}} + \beta_2 I_{\text{i}\in\text{treated,2017}} + \beta_3 I_{\text{i}\in\text{PME1,2016}} + \beta_4 I_{\text{i}\in\text{PME1,2017}} + \sum_{e=1}^{4} \gamma_e.\text{employment\_size}_{\text{i}\in e,\text{t-2}} + \\ & \sum_{s=1}^{18} \theta_s.\text{sector}_{\text{i}\in\text{s,t}} + \tau_1.\text{margin\_rate}_{\text{i,t-2}} + \tau_2.\text{eco\_r\_rate}_{\text{i,t-2}} + \tau_3.\text{cap\_intens}_{\text{i,t-2}} + \tau_4.\text{share\_turnover\_exported}_{\text{i,t-2}} + \\ & \delta_1.\Delta\text{margin\_rate}_{\text{i,t-2}} + \delta_2.\Delta\text{eco\_r\_rate}_{\text{i,t-2}} + \delta_3.\Delta\text{cap\_intens}_{\text{i,t-2}} + \delta_4.\Delta\text{share\_turnover\_exported}_{\text{i,t-2}} + u_{i,t}\end{aligned} \quad (3)$$

With:

- $I_{\text{i}\in\text{PME1,2016}}$ a dummy variable equal to 1 in 2016 if the business i belonged to the PME1 program. The associated coefficient therefore measures a specific effect related to the PME1 accelerator in 2016.
- $I_{\text{i}\in\text{PME1,2017}}$ a dummy variable equal to 1 in 2017 if the business i has moved into the PME1 program. The associated coefficient therefore measures the specific additional effect from the PME1 accelerator in 2017.
- The coefficient β_2 measures the effect of all PME1 to PM3 accelerators in 2017.
- $\beta_2 + \beta_4$ gives the effect of the PME1 accelerator in 2017.

Equation (3) will therefore be used to evaluate the effect of national SME accelerators using a difference in differences method[12].

[12] An equation similar to (3) can be given for the triple difference by including, as in (2), a fixed effect undertaken, capturing the unobserved heterogeneity in the variation of the performance variable.

7. Estimation results

We considered a relatively broad set of result variables: revenue, value added, gross operating profit, net earnings, balance sheet total, investment, salaried workforce size and a 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-1a and A-1b in Appendix 1).

We achieve effects significantly different from zero for the PME2 and PME3 accelerators on revenue, value added and capital expenditure. 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. 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, balance sheet total 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). This variable does not, of course, 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.

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) and therefore closer to the thresholds for changing from SME to mid-cap, without revenue or added value 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.

On the other hand, businesses participating in PME2 and PME3 are smaller, especially for the PME3 accelerator. Therefore, while their revenue and added value 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-2 in Appendix 2).

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.

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 (R2)	0.033	0.027	0.015	0.205

Sources: Bpifrance data, ALTARES and Appendix 1.
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).

To ensure the robustness of our results, we estimated the model using a triple difference method. 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.

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 1.
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).

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.

One interesting feature of the 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.

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, difference-in-differences-in-differences and panel data modeling to compare the first three cohorts of 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 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 very 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.

References

Ashenfelter, O. and Card, D. (1985). "Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs", The Review of Economics and Statistics*,* 67(4):648-60.

Bruhn M, Karlan D, and Schoar, A. (2010). What capital is missing in developing countries?" *American Economic Review* 100:629-33.

Card, D., Kluve J. and Weber, A. (2018). What Works? A Meta Analysis of Recent Active Labor Market Program Evaluations." *Journal of the European Economic Association*, 16(3), 894-931. doi: 10.3386/w21431.

Clarysse, B., Wright, M. and Van Hove, J. (2015). A look inside accelerators: Building businesses. Research Paper, Nesta.

Cohen, S. and Hochberg, Y. V. (2014). Accelerating Start-Ups: The Seed accelerator Phenomenon. Social Science Research Network, Working Paper no. 2418000,.

Cohen, S. (2013). What Do accelerators Do? Insights from Incubators and Angels. Innovations: Technology | Governance | Organizations 8 (3-4, Summer-Fall): 19-25.

Crișan, E. L., Salanță, I. I., Beleiu, I. N., Bordean, O. N. and Bunduchi, R. (2019). A systematic literature review on accelerators. *The Journal of Technology Transfer* 40.

Dalziel, M. (2018). Why are there (almost) no randomised controlled trial-based evaluations of business support programmes? Palgrave Communications 4:1.

Drori, I. and Wright, M. (2018). Accelerators: characteristics, trends and the new entrepreneurial ecosystem. In M. Wright (Ed.), Accelerator*s:* Successful venture creation and growth (pp. 1-20). Cheltenham: Edward Elgar Publishing.

Gielnik, M., Uyb, M. A., Funkena, R. and Bischoff, K. M. (2017). Boosting and sustaining passion: A long-term perspective on the effects of entrepreneurship training. *Journal of Business Venturing*, 32, 334-353.

Gilles, F., L'Horty, Y., Mihoubi, F. and Yang, X. (2018). *Les effets du CICE: une évaluation ex post*. *Economie et Prévision*, 2(21) :1-36.

Gonzalez-Uribe, J. and Leatherbee, M. (2018). The Effects of Business accelerators on Venture Performance: Evidence from Start-Up Chile. *The Review of Financial Studies*, Volume 31, Issue 4, April 2018, pp. 1566-1603, https://doi.org/10.1093/rfs/hhx103.

Hackett, S. M. and Dilts, D. M. (2004). A systematic review of business incubation research. *Journal of Technology Transfer*, 29, 55-82.

Hallen, B. L., Bingham, C. B. and Cohen, S. L. G. (2017). Do accelerators accelerate? A study of venture accelerators as a path to success. *Academy of Management Annual Meeting Proceedings*, Best Papers Published, 6 p.

Hausberg, J. P. and Korreck, S. (2018) Business incubators and accelerators: a co-citation analysis-based, systematic literature review. *The Journal of Technology Transfer* 29.

Hochberg, Y. V. (2016). Accelerating Entrepreneurs and Ecosystems: The Seed accelerator Model. *Innovation Policy and the Economy* 16 (2016): 25-51.

Iacus, S. M., King, G. and Porro, G. (2012). Causal Inference Without Balance Checking: Coarsened Exact Matching. *Political Analysis*, 20, 1, pp. 1-24.

Kerr, W. R., Lerner, J. and Schoar, A. (2014). The consequences of entrepreneurial finance: Evidence from angel financings. *Review of Financial Studies*, 27:20-55.

Larson, A. (1991). Partner networks: Leveraging external ties to improve entrepreneurial performance. *Journal of Business Venturing*, 6 (3):173-188.

Miller, P. and Bound, K. (2011). The Startup Factories. The rise of accelerator programmes to support new technology ventures. NESTA, discussion paper: June, 39 pp.

Mokry, B. (1988). Entrepreneurship and public policy: Can government stimulate business startups? Westport, CT: Greenwood Press.

Rosembaum, P. and Rubin, D. (1983). The central role of propensity score in observational studies for causal effects. *Biometrika*, 70(1):41-55.

Rubin, D. (1974). "Estimating causal effects of treatments in randomized and nonrandomized studies". *Journal of Educational Psychology*, 66(5), 699-701.

Smith, S. W. and Hannigan, T. J. (2015). Swinging for the fences: How do top accelerators impact the trajectories of new ventures? *Engineering*, forthcoming.

Stokan, E., Thompson, L. and Mahu, R. J. (2015). Testing the Differential Effect of Business Incubators on Firm Growth. *Economic Development quarterly*, Vol. 29 (4): 317-327.

Walshok, M. (2013). A Systemic Approach to Accelerating Entrepreneurship. Innovations: Technology | Governance | Organizations 8 (3-4, Summer-Fall):7-17.

Yu, S. (2016). How do accelerators Impact the Performance of High-Technology Ventures?, *Management Science*, forthcoming.

Appendix 1. Detailed estimation results.

Table A-1a. 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 VA (1)	Variation in the logarithm of the VA (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	0.033	-0.026	-0.025	1,156.208	530.213	-0.008	-0.009
	(0.238)	(0.237)	(0.574)	(0.600)	(0.988)	(0.994)	(0.229)	(0.201)
Effect of accelerators in 2017	**0.098****		**0.143****		**243,971.484***			
	(0.043)		**(0.040)**		**(0.090)**			
Effect of SME accelerators 2 and 3 in 2017		**0.098****		**0.160****		**257,409.000***		
		(0.042)		**(0.024)**		**(0.073)**		
Specific effect for SME1 in 2015							0.056	
							(0.154)	
Specific effect for SME1 in 2016	**0.004**		**0.064**		**268,713.781**		**0.076***	**0.075***
	(0.889)		**(0.302)**		**(0.386)**		**(0.066)**	**(0.069)**
Specific effect for SME1 in 2017					-434,935.094		0.052	0.051
	(0.069)		(0.026)		(0.251)		(0.213)	(0.221)
Indicators to take into account the economic situation:								
For the year 2013	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*
For the year 2014	0.002	0.002	-0.001	-0.001	37,952.609	37,866.012	-0.001	-0.001
	(0.892)	(0.892)	(0.961)	(0.974)	(0.635)	(0.635)	(0.594)	(0.560)
For the year 2015	0.016	0.016	-0.020	-0.019	98,653.703	98,552.016	0.026***	0.029***
	(0.279)	(0.279)	(0.294)	(0.301)	(0.176)	(0.176)	(0.000)	(0.000)
For the year 2016	-0.000	0.000	0.019	0.024	102,925.727	120,810.250	0.031***	0.031***
	(0.994)	(0.991)	(0.284)	(0.175)	(0.262)	(0.181)	(0.000)	(0.000)
For the year 2017	0.017	0.017	0.005	-0.009	36,086.266	22,212.291	0.032***	0.032***
	(0.196)	(0.199)	(0.775)	(0.630)	(0.679)	(0.800)	(0.000)	(0.000)
Company size (delayed by two years):								
Less than 20 employees	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*	*Benchmark*
Between 20 and 49 employees	-0.067***	-0.067***	-0.071**	-0.070**	4,290.846	2,908.919	2.83e-6	-0.001
	(0.000)	(0.000)	(0.013)	(0.013)	(0.945)	(0.963)	(0.999)	(0.927)
Between 50 and 99 employees					21,030.793	21,168.971	0.009	0.009*
	(0.000)	(0.000)	(0.007)	(0.007)	(0.756)	(0.753)	(0.103)	(0.090)
Between 100 and 249 employees	-0.106***	-0.106***	-0.088***	-0.091***	-15,698.823	-14,553.142	0.060***	0.061***
	(0.000)	(0.000)	(0.002)	(0.002)	(0.887)	(0.895)	(0.000)	(0.000)
Between 250 and 500 employees	-0.085**	-0.085**	-0.354	-0.377	-346,778.938	-347,608.969	0.734***	0.736***
	(0.038)	(0.035)	(0.126)	(0.130)	(0.453)	(0.439)	(0.000)	(0.000)
Indicators of belonging to a sector of economic activity:								
Agriculture	-0.001	-0.001	0.053	0.051	-60,172.633	-57,041.500	0.037	0.039
	(0.987)	(0.987)	(0.479)	(0.519)	(0.963)	(0.965)	(0.614)	(0.596)
Extractive industry	0.176*	0.176*	0.247***	0.258***	-55,987.645	-59,969.020	-0.024	
	(0.051)	(0.051)	(0.001)	(0.001)	(0.896)	(0.886)	(0.107)	(0.079)
Manufacturing industry	-0.036	-0.036	0.027	0.032	-10,929.223	-12,455.148	-0.008	-0.009
	(0.105)	(0.105)	(0.418)	(0.346)	(0.862)	(0.826)	(0.569)	(0.486)
Energy	-0.115***	-0.115***	-0.021	-0.013	-298,841.219	-300,642.188	0.004	0.002
	(0.000)	(0.000)	(0.724)	(0.825)	(0.836)	(0.836)	(0.794)	(0.883)
Water and waste			0.014	0.021	-212,843.313	-215,470.422	0.001	-0.002
	(0.041)	(0.041)	(0.788)	(0.691)	(0.194)	(0.183)	(0.970)	(0.940)
Building / public works	-0.040	-0.040	0.006	0.013	2,981.759	1,028.559	-0.002	-0.004
	(0.111)	(0.110)	(0.862)	(0.717)	(0.960)	(0.985)	(0.911)	(0.811)
Wholesale and retail trade, repair of motor vehicles and motorcycles			0.015	0.021	-26,667.211	-28,111.482	0.002	-0.001
	(0.070)	(0.070)	(0.674)	(0.571)	(0.652)	(0.620)	(0.909)	(0.995)
Transport			0.004	0.013	64,837.211	62,101.629	0.008	0.005
	(0.054)	(0.054)	(0.898)	(0.716)	(0.783)	(0.791)	(0.684)	(0.785)
Lodging and catering	-0.073	-0.073	-0.022	-0.015	6,978.185	5,458.025	-0.003	-0.005
	(0.271)	(0.271)	(0.793)	(0.860)	(0.984)	(0.987)	(0.845)	(0.733)
Information and communication	0.044	0.044	0.072	0.077	8,101.177	7,305.545	0.009	0.008
	(0.136)	(0.136)	(0.132)	(0.108)	(0.902)	(0.910)	(0.591)	(0.640)
Financial and insurance activities	-0.121***	-0.121***	-0.047	-0.039	-188,238.422	-189,945.188	-0.004	-0.006
	(0.001)	(0.001)	(0.414)	(0.503)	(0.388)	(0.380)	(0.782)	(0.661)

Real estate activities	0.043	0.043	0.034	0.041	-383,061.813*	-385,712.813*	-0.006	-0.008
	(0.461)	(0.460)	(0.823)	(0.787)	(0.084)	(0.081)	(0.672)	(0.570)
Specialized, scientific and technical activities	-0.033	-0.033	0.003	0.010	-71,127.305	-72,194.750	-0.001	-0.002
	(0.245)	(0.246)	(0.938)	(0.830)	(0.480)	(0.473)	(0.982)	(0.882)
Administrative and support services activities	-0.029	-0.029	0.042	0.050	161,042.813	159,217.703	0.019	0.016
	(0.293)	(0.293)	(0.339)	(0.271)	(0.481)	(0.485)	(0.344)	(0.403)
Education	-0.037	-0.037	0.064	0.074	166,087.813	162,626.734	-0.062***	-0.065***
	(0.684)	(0.684)	(0.421)	(0.359)	(0.637)	(0.639)	(0.000)	(0.000)
Human health and social action	0.024	0.024	0.121	0.132	388,129.063	386,823.250	-0.060***	-0.063***
	(0.795)	(0.794)	(0.266)	(0.226)	(0.385)	(0.383)	(0.000)	(0.000)
Arts, entertainment and recreation	0.101	0.101	0.335*	0.346*	-365,724.719	-368,581.094	0.105	0.102
	(0.153)	(0.152)	(0.091)	(0.085)	(0.747)	(0.746)	(0.148)	(0.158)
Other services activities	0.043	0.043	0.126***	0.135***	-257,101.063	-258,574.813	-0.013	-0.012
	(0.345)	(0.344)	(0.004)	(0.005)	(0.575)	(0.566)	(0.342)	(0.255)
Ratios characterizing the economic situation of companies:								
Levels (delayed by two years):								
Margin rate	-0.000	-0.000	0.003	0.003	7,208.048	7,184.389	0.000	0.000
	(0.935)	(0.934)	(0.631)	(0.633)	(0.489)	(0.489)	(0.810)	(0.581)
Capital intensity	0.000*	0.000*	0.000*	0.000*	0.256	0.257	-1.27e-8**	-1.29e-8**
	(0.068)	(0.067)	(0.054)	(0.054)	(0.112)	(0.111)	(0.030)	(0.028)
Apparent work productivity	-0.000***	-0.000***	-0.000**	-0.000**	0.130	0.128	3.83e-8*	3.86e-8*
	(0.009)	(0.009)	(0.037)	(0.038)	(0.624)	(0.628)	(0.079)	(0.077)
Economic profitability	0.000	0.000	0.004**	0.004**	-1,097.644	-1,110.060	0.000	0.000
	(0.973)	(0.973)	(0.017)	(0.017)	(0.373)	(0.370)	(0.337)	(0.341)
Percentage of revenue generated from exports	0.009	0.009	0.017	0.016	57,990.156	59,127.352	-0.002	-0.002
	(0.719)	(0.719)	(0.580)	(0.593)	(0.472)	(0.465)	(0.819)	(0.867)
Variations (delayed by two years):								
- of the margin rate	0.000	0.000	-0.003	-0.003	-13,088.676	-13,070.598	0.000	0.000
	(0.921)	(0.921)	(0.551)	(0.552)	(0.141)	(0.140)	(0.771)	(0.731)
- capital intensity	-0.000	-0.000	-0.000	-0.000	-1.222	-1.227	1.36e-8	1.51e-8
	(0.617)	(0.615)	(0.296)	(0.289)	(0.182)	(0.180)	(0.151)	(0.111)
- apparent labor productivity	0.000	0.000	-0.000	-0.000	0.448	0.451	-1.35e-8	-1.56e-8
	(0.377)	(0.377)	(0.922)	(0.911)	(0.335)	(0.332)	(0.405)	(0.336)
- economic profitability	0.001	0.001	0.001	0.001	1,558.711	1,585.940	1.56e-6	1.07e-6
	(0.192)	(0.191)	(0.278)	(0.271)	(0.242)	(0.235)	(0.981)	(0.988)
- of the share of revenue generated from exports	0.002	0.002	0.039*	0.039*	42,039.352	42 539.305	-0.008	-0.008
	(0.934)	(0.934)	(0.066)	(0.065)	(0.428)	(0.424)	(0.264)	(0.275)
Intercept	0.161***	0.161***	0.100**	0.094*	-35,009.504	-33,398.578	-0.018	-0.016
	(0.000)	(0.000)	(0.034)	(0.053)	(0.690)	(0.696)	(0.185)	(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-1b. 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 VA	Change in capital expenditure
Acceleration indicators:			
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)**
Indicators to take into account the economic situation:			
For the year 2013	*Benchmark*	*Benchmark*	*Benchmark*
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)
Company's workforce (delayed by two years):			
Less than 20 employees	*Benchmark*	*Benchmark*	*Benchmark*
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)
Ratios characterizing the economic situation of companies:			
Levels (delayed by two years):			
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)
Variations (delayed by two years):			
- 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 2. Definition of company statuses.

Table A-2. 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.

TEPP Working Papers 2021

21-5. Organisational changes and long term sickness absence and injury leave
Mohamed Ali Ben Halima, Nathalie Greenan, Joseph Lanfranchi

21-4. The unexplored discriminations towards youth : equal access to goods and services
David Gray, Yannick L'Horty, Souleymane Mbaye, Pascale Petit

21-3. The zero effect of income tax on the timing of birth: some evidence on French data
Nicolas Moreau

21-2. Tropical cyclones and fertility : new evidence from Madagascar
Idriss Fontaine, Sabine Garabedian, David Nortes-Martinez, Hélène Vérèmes

21-1. On the heterogeneous impacts of the COVID-19 lockdown on US unemployment
Malak Kandoussi, François Langot

TEPP Working Papers 2020

20-8. COVID-19 mortality and health expenditures across European countries: The positive correlation puzzle
Serge Blondel, Radu Vranceanu

20-7. Measuring discrimination in the labour market
Emmanuel Duguet

20-6. The effects of age on educational performances at the end of primary school: cross-sectional and regression discontinuity approach applications from Reunion Island
Daniel Rakotomalala

20-5. Slowdown antitrust investigations by decentralization
Emilie Dargaud, Armel Jacques

20-4. Is international tourism responsible for the pandemic of COVID19? A preliminary cross-country analysis with a special focus on small islands
Jean-François Hoarau

20-3. Does labor income react more to income tax or means tested benefit reforms?
Michaël Sicsic

20-2. Optimal sickness benefits in a principal-agent model
Sébastien Ménard

20-1. The specific role of agriculture for economic vulnerability of small island spaces
Stéphane Blancard, Maximin Bonnet, Jean-François Hoarau

TEPP Working Papers 2019

19-8. The impact of benefit sanctions on equilibrium wage dispersion and job vacancies
Sebastien Menard

19-7. Employment fluctuations, job polarization and non-standard work: Evidence from France and the US
Olivier Charlot, Idriss Fontaine, Thepthida Sopraseuth

19-6. Counterproductive hiring discrimination against women: Evidence from French correspondence test
Emmanuel Duguet, Loïc du Parquet, Yannick L'Horty, Pascale Petit

19-5. Inefficient couples: Non-minimization of the tax burden among French cohabiting couples
Olivier Bargain, Damien Echevin, Nicolas Moreau, Adrien Pacifico

19-4. Seeking for tipping point in the housing market: evidence from a field experiment
Sylvain Chareyron, Samuel Gorohouna, Yannick L'Horty, Pascale Petit, Catherine Ris

19-3. Testing for redlining in the labor market
Yannick L'Horty, Mathieu Bunel, Pascale Petit

19-2. Labour market flows: Accounting for the public sector
Idriss Fontaine, Ismael Galvez-Iniesta, Pedro Gomes, Diego Vila-Martin

19-1. The interaction between labour force participation of older men and their wife: lessons from France
Idriss Fontaine

TEPP Working Papers 2018

18-15. Be healthy, be employed: a comparison between the US and France based on a general equilibrium model
Xavier Fairise, François Langot, Ze Zhong Shang

18-14. Immigrants' wage performance in the routine biased technological change era: France 1994-2012
Catherine Laffineur, Eva Moreno-Galbis, Jeremy Tanguy, Ahmed Tritah

18-13. Welfare cost of fluctuations when labor market search interacts with financial frictions
Elini Iliopulos, François Langot, Thepthida Sopraseuth

18-12. Accounting for labor gaps
François Langot, Alessandra Pizzo

18-11. Unemployment fluctuations over the life cycle
Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

18-10. Layoffs, Recalls and Experience Rating
Julien Albertini, Xavier Fairise

18-9. Environmental policy and health in the presence of labor market imperfections
Xavier Pautrel

18-8. Identity mistakes and the standard of proof
Marie Obidzinski, Yves Oytana

18-7. Presumption of innocence and deterrence
Marie Obidzinski, Yves Oytana

18-6. Ethnic Discrimination in Rental Housing Market: An Experiment in New Caledonia
Mathieu Bunel, Samuel Gorohouna, Yannick L'Horty, Pascale Petit, Catherine Ris

18-5. Evaluating the impact of firm tax credits. Results from the French natural experiment CICE
Fabrice Gilles, Yannick L'Horty, Ferhat Mihoubi, Xi Yang

18-4. Impact of type 2 diabetes on health expenditure: an estimation based on individual administrative data
François-Olivier Baudot , Anne-Sophie Aguadé,Thomas Barnay, Christelle Gastaldi-Ménager, Anne Fargot-Campagna

18-3. How does labour market history influence the access to hiring interviews?
Emmanuel Duguet, Rémi Le Gall, Yannick L'Horty, Pascale Petit

18-2. Occupational mobility and vocational training over the life cycle
Anthony Terriau

18-1. Retired, at last? The short-term impact of retirement on health status in France
Thomas Barnay, Eric Defebvre

TEPP Working Papers 2017

17-11. Hiring discrimination against women: distinguishing taste based discrimination from statistical discrimination
Emmanuel Duguet, Loïc du Parquet, Pascale Petit

17-10. Pension reforms, older workers' employment and the role of job separation and finding rates in France
Sarah Le Duigou, Pierre-Jean Messe

17-9. Healthier when retiring earlier? Evidence from France
Pierre-Jean Messe, François-Charles Wolff

17-8. Revisting Hopenhayn and Nicolini's optimal unemployment insurance with job search monitoring and sanctions
Sebastien Menard, Solenne Tanguy

17-7. Ethnic Gaps in Educational Attainment and Labor-Market Outcomes: Evidence from France
Gabin Langevin, David Masclet, Fabien Moizeau, Emmanuel Peterle

17-6. Identifying preference-based discrimination in rental market: a field experiment in Paris
Mathieu Bunel, Yannick L'Horty, Loïc du Parquet, Pascale Petit

17-5. Chosen or Imposed? The location strategies of households
Emilie Arnoult, Florent Sari

17-4. Optimal income taxation with composition effects
Laurence Jacquet, Etienne Lehmann

17-3. Labor Market Effects of Urban Riots: an experimental assessment
Emmanuel Duguet, David Gray, Yannick L'Horty, Loic du Parquet, Pascale Petit

17-2. Does practicing literacy skills improve academic performance in first-year university students? Results from a randomized experiment
Estelle Bellity, Fabrices Gilles, Yannick L'Horty

17-1. Raising the take-up of social assistance benefits through a simple mailing: evidence from a French field experiment
Sylvain Chareyron, David Gray, Yannick L'Horty

TEPP Working Papers 2016

16-8. Endogenous wage rigidities, human capital accumulation and growth
Ahmed Tritah

16-7. Harder, better, faster...yet stronger? Working conditions and self-declaration of chronic diseases
Eric Defebvre

16-6. The influence of mental health on job retention
Thomas Barnay, Eric Defebvre

16-5. The effects of breast cancer on individual labour market outcomes: an evaluation from an administrative panel
Thomas Barnay, Mohamed Ali Ben Halima, Emmanuel Duguet, Christine Le Clainche, Camille Regaert

16-4. Expectations, Loss Aversion, and Retirement Decisions in the Context of the 2009 Crisis in Europe
Nicolas Sirven, Thomas Barnay

16-3. How do product and labor market regulations affect aggregate employment, inequalities and job polarization? A general equilibrium approach
Julien Albertini, Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

16-2. Access to employment with age and gender: results of a controlled experiment Laetitia Challe, Florent Fremigacci, François Langot, Yannick L'Horty, Loïc Du Parquet, Pascale Petit

16-1. An evaluation of the 1987 French Disabled Workers Act: Better paying than hiring
Thomas Barnay, Emmanuel Duguet, Christine Le Clainche, Yann Videau

TEPP Working Papers 2015

15-10. Optimal Income Taxation with Unemployment and Wage Responses: A Sufficient Statistics Approach
Kory Kroft, Kavan Kucko, Etienne Lehmann, Johannes Schmieder

15-9. Search frictions and (in) efficient vocational training over the life-cycle
Arnaud Chéron, Anthony Terriau

15-8. Absenteeism and productivity: the experience rating applied to employer contributions to health insurance
Sébastien Ménard, Coralia Quintero Rojas

15-7. Take up of social assistance benefits: the case of homeless
Sylvain Chareyron

15-6. Spatial mismatch through local public employment agencies. Answers from a French quasi-experiment
Mathieu Bunel, Elisabeth Tovar

15-5. Transmission of vocational skills at the end of career: horizon effect and technological or organisational change
Nathalie Greenan, Pierre-Jean Messe

15-4. Protecting biodiversity by developing bio-jobs: A multi-branch analysis with an application on French data
Jean De Beir, Céline Emond, Yannick L'Horty, Laetitia Tuffery

15-3. Profit-Sharing and Wages: An Empirical Analysis Using French Data Between 2000 and 2007
Noélie Delahaie, Richard Duhautois

15-2. A meta-regression analysis on intergenerational transmission of education: publication bias and genuine empirical effect
Nicolas Fleury, Fabrice Gilles

15-1. Why are there so many long-term unemployed in Paris?
Yannick L'Horty, Florent Sari

TEPP Working Papers 2014

14-14. Hiring discrimination based on national origin and the competition between employed and unemployed job seekers
Guillaume Pierné

14-13. Discrimination in Hiring: The curse of motorcycle women
Loïc Du Parquet, Emmanuel Duguet, Yannick L'Horty, Pascale Petit

14-12. Residential discrimination and the ethnic origin: An experimental assessment in the Paris suburbs
Emmanuel Duguet, Yannick L'Horty, Pascale Petit

14-11. Discrimination based on place of residence and access to employment
Mathieu Bunel, Yannick L'Horty, Pascale Petit

14-10. Rural Electrification and Household Labor Supply: Evidence from Nigeria
Claire Salmon, Jeremy Tanguy

14-9. Effects of immigration in frictional labor markets: theory and empirical evidence from EU countries
Eva Moreno-Galbis, Ahmed Tritah

14-8. Health, Work and Working Conditions: A Review of the European Economic Literature
Thomas Barnay

14-7. Labour mobility and the informal sector in Algeria: a cross-sectional comparison (2007-2012)
Philippe Adair, Youghourta Bellache

14-6. Does care to dependent elderly people living at home increase their mental health?
Thomas Barnay, Sandrine Juin

14-5. The Effect of Non-Work Related Health Events on Career Outcomes: An Evaluation in the French Labor Market
Emmanuel Duguet, Christine le Clainche

14-4. Retirement intentions in the presence of technological change: Theory and evidence from France
Pierre-Jean Messe, Eva Moreno-Galbis, Francois-Charles Wolff

14-3. Why is Old Workers' Labor Market more Volatile? Unemployment Fluctuations over the Life-Cycle
Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

14-2. Participation, Recruitment Selection, and the Minimum Wage
Frédéric Gavrel

14-1. Disparities in taking sick leave between sectors of activity in France: a longitudinal analysis of administrative data
Thomas Barnay, Sandrine Juin, Renaud Legal

TEPP Working Papers 2013

13-9. An evaluation of the impact of industrial restructuring on individual human capital accumulation in France (1956-1993)
Nicolas Fleury, Fabrice Gilles

13-8. On the value of partial commitment for cooperative investment in buyer-supplier relationship
José de Sousa, Xavier Fairise

13-7. Search frictions, real wage rigidities and the optimal design of unemployment insurance
Julien Albertini, Xavier Fairise

13-6. Tax me if you can! Optimal nonlinear income tax between competing governments
Etienne Lehmann, Laurent Simula, Alain Trannoy

13-5. Beyond the labour income tax wedge: The unemployment-reducing effect of tax progressivity
Etienne Lehmann, Claudio Lucifora, Simone Moriconi, Bruno Van Der Linden

13-4. Discrimination based on place of residence and access to employment
Mathieu Bunel, Emilia Ene Jones, Yannick L'Horty, Pascale Petit

13-3. The determinants of job access channels: evidence from the youth labor market in France
Jihan Ghrairi

13-2. Capital mobility, search unemployment and labor market policies: The case of minimum wages
Frédéric Gavrel

13-1. Effort and monetary incentives in Nonprofit et For-Profit Organizations
Joseph Lanfranchi, Mathieu Narcy

The TEPP Institute

The CNRS **Institute for Theory and Evaluation of Public Policies** (the TEPP Institute, FR n°2024 CNRS) gathers together research centres specializing in economics and sociology:

- L'**Equipe de Recherche sur l'Utilisation des Données Individuelles en lien avec la Théorie Economique** (Research Team on Use of Individuals Data in connection with economic theory), **ERUDITE**, University of Paris-Est Créteil and University of Gustave Eiffel
- Le **Centre d'Etudes des Politiques Economiques de l'université d'Evry** (Research Centre focused on the analysis of economic policy and its foundations and implications), **EPEE**, University of Evry Val d'Essonne
- Le **Centre Pierre Naville** (Research on Work and Urban Policies), **CPN**, University of Evry Val d'Essonne
- Le **Groupe d'Analyse des Itinéraires et des Niveaux Salariaux** (Group on Analysis of Wage Levels and Trajectories), **GAINS**, University of Le Mans
- Le **Centre de Recherches en Economie et en Management**, (Research centre in Economics and Management), **CREM**, University of Rennes 1 et University of Caen Basse-Normandie
- Le **Groupe de Recherche ANgevin en Économie et Management** (Angevin Research Group in Economics and Management), **GRANEM**, University of Angers
- Le **Centre de Recherche en Economie et Droit** (Research centre in Economics and Law) **CRED**, University of Paris II Panthéon-Assas
- Le **Laboratoire d'Economie et de Management Nantes-Atlantique** (Laboratory of Economics and Management of Nantes-Atlantique) LEMNA, University of Nantes
- Le **Laboratoire interdisciplinaire d'étude du politique Hannah Arendt** – Paris Est, **LIPHA-PE**
- Le **Centre d'Economie et de Management de l'Océan Indien**, **CEMOI**, University of La Réunion

TEPP brings together 230 teacher-researchers and 100 doctoral students. It is both one of the main academic operators in the evaluation of public policies in France, and the largest multidisciplinary federation of research on work and employment. It responds to the demand for impact assessment of social programs using advanced technologies combining theoretical and econometric modeling, qualitative research techniques and controlled experiences.

www.tepp.eu