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THE IMPACT OF SUBSIDIZING EARLY YOUNG INNOVATIVE COMPANIES ON THEIR ACCESS TO CAPITAL MARKET

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Abstract

Young Innovative Companies (YICs) face barriers to pursuing their projects due to limited financial resources and restricted access to capital. This study examines whether public subsidies help alleviate these constraints, focusing on the French Public Investment Bank's (BPIFrance) Individual Aid program. The findings confirm that subsidies improve YICs' access to capital markets, mainly by reducing information asymmetry for investors. Additionally, results show that the total available funds in the private equity market significantly influences the volume of capital raised, while participation in the subsidy program is the key factor determining the likelihood of securing funding.

Key words: YICs, R&D investment, public subsidies, impact evaluation, access to capital market, causal channel, certification effect, prototyping effect

JEL: D22, G24,G32,H29, O31, O38

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1 Introduction

Innovation from private companies is a significant driver of overall technological change, particularly through knowledge spillovers. Among firms, Young Innovative Companies (YICs), also known as startups, are believed to play a crucial role in this dynamic and so to be particularly relevant for growth and job creation (Criscuolo et al., 2014; Decker et al., 2014). The importance of YICs is mainly attributed to their over-representation in the production of disruptive innovations (Schumpeter, 1942; Baumol, 2004; Schneider and Veugelers, 2010). Disruptive innovations refer to those that create new markets or enter existing ones by replacing previously dominant products (Colombo et al., 2015). In that sense, recent evidence from Kolev et al. (2023) suggests that patents filed by startups receive more than twice as many citations as those filed by incumbent firms over time, highlighting their relative importance for subsequent research.[2]

However, Young Innovative Companies (YICs) occupy a paradoxical position in the innovation landscape: while they are key drivers of technological progress, they also face significant challenges in conducting their Research and Development (R&D) activities. Due to their youth and inexperience, they often lack the necessary resources to advance their projects—a situation exacerbated by their constrained access to capital markets. Several factors contribute to this constrained access, including the absence of track records, insufficient tangible assets to serve as collateral, high levels of information asymmetry, and the inherent uncertainty surrounding innovation and commercial success (Stiglitz and Weiss, 1981; Hall and Lerner, 2010; Swinney et al., 2011; Alperovych et al., 2020). As is often the case in the presence of market failures, the literature advocates for public intervention—particularly through subsidies—alongside the development of specialized financial sectors such as venture capital (Spence, 1984; de Bettignies, 2008; Lerner, 2010; Buchner et al., 2023).

In this context, this paper aims to understand how public subsidies to Young Innovative Companies (YICs) can ease their access to capital market. To this end, I explore the different mechanisms through which the Individual Aids (IA) program, run by the French Public Investment Bank, generates its impacts, considering channels related both to selection into the program and the subsidy itself. I focus on subsidies distributed during the period 2010–2018, with particular attention to

[2]Bulletin on Entrepreneurship - Startups Drive Commercialization of High-Impact Innovations - NBER - 2023 - Patent citations are frequently used as a proxy for the radicality or disruptiveness of an innovation, capturing the intangible social and technological impact of a research endeavor.

more vulnerable firms, specifically YICs at the seed stage. Additionally, the study investigates the role of financial market development in shaping the magnitude of the program's impact.

The Individual Aid (IA) scheme is the largest subsidy program administered by BPIfrance (the French Public Investment Bank), one of the main grant providers in France and the foremost supporter of private R&D. It offers selective financial support through a competitive application process. Using a Difference-in-Differences (DiD) approach, I find that participation in the IA program improves access to capital markets. On average, one euro of subsidy leads to an increase of 8.1 in equity and 5.1 in debt three years after treatment. The impact of the Individual Aids appears to primarily stem from a decrease in information asymmetry. Given the program's design—particularly the relatively modest size of the grants, averaging €36,000 in our sample—it may have incentivized private investors to back supported firms through two main causal channels. First, enrollment might serve as a signal to the market regarding the quality of the firm or its project, thereby reducing information asymmetry; this causal channel is known as the certification effect. Alternatively, the grant could help advance the R&D development of the YICs' projects. With more mature innovations, technical risk is likely lowered, making investments safer—a process referred to as the prototyping effect.

To distinguish between these two channels, I rely on three indicators, all based on the premise that timing provides an effective lens for understanding the program's underlying mechanisms. The first indicator is general—the temporality of impact. An early impact aligns with the certification effect, where selection brings new information to the market. In contrast, a prototyping effect would require additional research and project maturation, thus producing a deferred treatment effect. The other two indicators isolate each potential channel: to capture the certification effect, I measure the impact of selection into the program before firms receive subsidy funds; for the prototyping effect, I examine the delayed impact of additional funds allocated to R&D on access to capital. All three indicators converge toward a certification effect and exclude a prototyping effect.

Finally, I examine the interaction between the program's impact and the development of relevant segments of the capital market. Over the observation period, investments in private capital have gained importance, leading to a corresponding increase in total funds invested in startups. This macroeconomic shift likely interacts with the treatment effect. Additional findings confirm this hypothesis. When including the total funds invested annually through relevant private market segments in the

main equation, total outstanding capital emerges as the primary driver of the additional volume of capital raised post-treatment—particularly for equity—while the treatment itself appears to be the main factor increasing the probability of accessing the market.

The results confirm the importance of the selection process in explaining the success of subsidies to YICs. At least when grants are limited in size, operators should prioritize their selection process to maintain the effectiveness of their policy, leveraging the label effect. The findings further suggest that the more favorable the market conditions, the stricter the selection process should be, as the volume of funds raised increases with the total outstanding funds in the private capital market. Consequently, supported firms should display higher expected returns on investment.

This study makes several contributions to the literature. First, it contributes to the nascent research on the causal channels underlying subsidy programs. Impact evaluations of R&D programs have primarily focused on testing the additionality of the program, i.e., the increase in R&D and innovation activities of supported firms following public intervention (Lerner, 1999; Czarnitzki and Delanote, 2012; Dimos and Pugh, 2016). Few works have been dedicated to unraveling the levers through which these programs produce their effects. Even fewer have focused on a specific barrier, such as access to the capital market, systematically exploring all potential channels at play (Söderblom et al., 2015; Howell, 2017; Chiappini et al., 2022). Second, it focuses on Young Innovative Companies, specifically those in the early development phase, also known as the seed stage. Controlling for endogeneity, in this context, is particularly challenging due to the lack of firms' history. Without it, accounting for pre-trends becomes impossible, making it difficult to ensure that no unobservable differences remain between the treated population and their counterfactuals. Very few studies have attempted to tackle this issue (Söderblom et al., 2015; Hottenrott and Richstein, 2020). In the case of R&D subsidies, endogeneity can arise both from public authority selection and firms' self-selection in applying for grants. In this context, I suggest that, instead of relying on the parallel trends assumption to argue that potential endogeneity has been addressed, one can directly control for differences in subsidiability—that is, the firms' ability and propensity to apply for and obtain subsidies. I argue that if the inclusion of the actual subsidies received by firms in the main difference-in-differences (DiD) regression does not alter the size or significance of the treatment effect, this suggests that the matching procedure has successfully orthogonalized the treatment variable with

respect to potential selection and self-selection behaviors that could otherwise introduce endogeneity. Finally, the findings also provide insights on how programs adjust to changes in the private market. The time adjustment of public policy is still an underexplored subject in impact evaluations. By addressing these questions, the results offer elements to improve the design of similar policies and adjust their calibration in response to variations in economic conditions.

The rest of the paper is organized as follows. Section 2 reviews the literature in related fields. Section 3 describes the program and the data. Section 4 is dedicated to the methodology, providing an extensive description of the identification strategy and matching methodology. The results are discussed in Section 5, and Section 6 concludes the paper.

2 Related Literature

Research and Development investments face two key issues. First, the knowledge generated through R&D is non-rival. It can be exploited by multiple firms once it becomes public. Second, R&D creates spillovers, where firms' investments often benefit others who can capitalize on the results. Consequently, firms tend to under-invest in R&D compared to the socially optimal level. For Young Innovative Companies, this gap is further widened by their limited access to capital market. Multiple causes explain this constrained access. YICs often have limited self-financing capacity and possess few tangible assets that could serve as collateral. The assets they generate are mostly intangible and closely tied to human capital, which is volatile and makes securing funding particularly challenging (Hall and Lerner, 2010). Furthermore, due to their limited age and track record, startups encounter issues related to information asymmetry. While they generally have a better understanding of their chances for success than external investors, sharing detailed information about their projects is often impractical. The technical complexity of their ventures increases informational costs, and there is often insufficient data on management quality (Howell, 2020; Ferrucci et al., 2020). Additionally, a principal-agent relation may develop, where managers prioritize short-term financial gains over long-term innovation, creating a misalignment with investor interests (Brown et al., 2009; Ferrucci et al., 2020). Independent YICs are particularly vulnerable compared to those backed by a corporate group, which can leverage the parent company's capital and reputation to mitigate those barriers (Czarnitzki and Hottenrott, 2011; Czarnitzki and Delanote, 2015).

Therefore, in the case of Young Innovative Companies, government support for public R&D seeks not only to compensate the gap between private investment and the socially optimal level but also to facilitate firms' access to capital markets (Stiglitz and Weiss, 1981; Spence, 1984; de Bettignies, 2008; Lerner, 2010; Buchner et al., 2023). Previous literature has identified three key effects through which direct support, such as subsidies, can enhance a firm's ability to access funding: a prototyping effect, a liquidity channel, and a certification effect. As mentioned in the introduction, a prototyping effect involves the use of additional funds allocated to R&D through subsidies, enabling firms to develop a demonstrator or prototype that showcases the technical viability of their projects. This reduction in technical risk lowers the probability of total losses for external investors (Howell, 2017; Santoleri et al., 2020). The liquidity channel, or de-risking effect, occurs when grants improve a firm's cash flow, providing a financial cushion against risks, enhancing solvency, and thereby making the firm more appealing to investors. This increased liquidity strengthens the firm's financial position and improves its ability to secure additional external financing (Meuleman and De Maeseneire, 2012). Finally, the certification effect occurs when grants signal the quality of a firm, reducing informational asymmetries. By certifying the firm's potential, grants act as a form of endorsement, signaling to investors that the firm has been vetted and is worthy of further investment (Lerner, 1999; Meuleman and De Maeseneire, 2012).

This study belongs to the literature on impact evaluations of innovation subsidies. Previous studies in this field have primarily focused on testing the additionality of public funds. Additionality refers to the positive societal effects stemming from changes in R&D spending, company behavior, or performance that would not have occurred without public support. Generally, they employ quasi-experimental methodologies to assess either an incentive impact or a final impact (Einiö, 2014; Dimos and Pugh, 2016; Aguiar and Gagnepain, 2017; Smith, 2020). An incentive impact corresponds to an increase in R&D activities (through funding and human resources), while a final impact is associated with a rise in a firm's innovations (e.g., patents or new products). Dimos and Pugh (2016) conduct a meta-regression analysis of such microeconomic studies on public R&D subsidies. Their findings suggest that subsidies often complement private R&D, with little evidence of crowding out, though evidence of a ripple effect remain inconclusive. Part of the literature specifically examines subsidy programs aimed at startups (Schneider and Veugelers, 2010; Herrera et al., 2012; Czarnitzki and

Delanote, 2015). Schneider and Veugelers (2010) investigate the impact of a general German R&D subsidy program on YICs. They show that the program studied, not specifically targeting YICs, has on average a positive effect on innovative sales but fails to create a significant impact on YICs. Herrera et al. (2013) focus on the heterogeneous effects of R&D subsidies among firms of different sizes. They find that R&D subsidies are most effective in boosting private R&D intensity (incentive effect) for small and medium-sized firms, which face greater financial challenges compared to large firms. Other works focus on tools and policy calibrations, such as the differences between the impacts of subsidies and repayable advances, as well as the profiles of firms supported by public authorities (Mas-Tur and Simon-Moyen, 2015; Bellucci et al., 2019; Hottenrott and Reichstein, 2020).

Some more recent research has shifted its focus to unraveling causal channels underlying the impacts observed. This is a less explored facet of the literature to which I aim to contribute. The bulk of studies in this field have focused on subsidies distributed to Small and Medium Enterprises (SMEs). Yet, no consensus has been reached on the mechanisms at play. The findings of Howell (2017) on the US Department of Energy's SBIR grant program and Santoleri et al. (2020) on the SME Instrument in Europe indicate that the positive impact of receiving a grant on a firm's economic performance, innovation output, and access to external equity, such as venture capital, is primarily driven by a prototyping effect. In contrast, Lerner (1999), using US data, argues that SBIR awards played a key role in certifying firm quality for equity investors. Similarly, Bellucci et al. (2019) find in Italy that public funding of SME innovation projects plays a certification role, influencing the debt structure of subsidized firms. More recently, Chiappiani et al. (2022), studying another BPIFrance program, find a significant improvement in access to bank financing for subsidized firms, although the effect is more pronounced for micro and small firms that have been operating for about six years. However, they do not observe any significant improvement in access to equity financing. This latter result is partly explained by a substitution effect between bank debt and equity financing. In contrast, very few studies have focused on YICs. Hottenrott and Richstein (2020), working on a German program, find that subsidizing young firms increases their access to bank loans. They highlight the importance of certification in explaining the observed impacts. Finally, Söderblom et al. (2015) hypothesize the existence of a certification effect from the subsidy, focusing on the highly selective VINN NU program in Sweden. They show that subsidies enable new ventures to attract more

human and financial capital than non-subsidized ones. In turn, they argue that improved access to capital significantly impacts the venture's long-term performance. To the best of my knowledge, no study has systematically tackled the question of subsidy impact on YICs' access to capital markets, considering both equity and debt, and simultaneously exploring the different causal channels that may be at play. It is this gap I aim to fill.

3 Program Description and Data

3.1 The Individual Aid scheme from BPIFrance

BPIFrance, the French Public Investment Bank, is a primary operator of grant programs in France and the foremost for Young Innovative Companies. It administers various programs supporting private innovation, including guaranteed loans, repayable advances, exportation support, and subsidies. Among these, the Individual Aid (IA) scheme stands out as the largest subsidy program for innovation in France, both in terms of total budget and the number of firms supported, with an average annual budget of €400 million supporting 2,600 firms. The program was initially launched by OSEO in 2005, a previously existing public grant operator, and was later taken over by BPIFrance at its creation in 2012. I observe grants distributed between 2010 and 2018 within an observation timeframe from 2008 and 2021. The IA scheme operates similarly to a bank, where firms with innovation projects can apply for grants at BPI's regional agencies throughout France at any point in time, akin to applying for a loan at a conventional bank. The program's organization is deconcentrated and not decentralized; local agencies select projects based on nationally defined eligibility criteria and guidelines. Before selection, projects are assessed by a team of examiners with expertise and experience in the technical areas relevant to the submitted projects. This process helps to lend credibility to any signal that the program participation could send regarding the quality of the recipient firms.

Table 1: Distribution of the Subisdies Granted to YICs

	Min	1st Qu	Median	Mean	3rd Qu	Max
Subsidies	1.5	23	30	36	38	8,000

Note: This table reports the distribution of IA grants for firms meeting our criteria. The information is drawn from the ADEME database and is expressed in thousands of euros.

IA targets projects in the feasibility or demonstration phases, aligning with early-stage innovations

held by any type of for-profit firms without any sectoral restrictions. Despite the program is not exclusively dedicated to YICs, they represent a fair share of supported companies. During the period of interest, an estimated €506 millions in subsidies was granted to YICs.

No official definition of YICs exists, neither economically nor legally. I bridge this gap by building on existing literature, which has led me to identify three key criteria. Typically, definitions of Young Innovative Companies incorporate aspects of age and innovation profile. First, most papers do not explicitly define YICs but instead study policies aimed at these firms, implicitly adopting the public authority's definition (Söderblom et al., 2015; Hottenrott and Richstein, 2020). A common feature of these programs is the focus on companies less than a few years old. In Hottenrott and Richstein (2020), the majority of firms in the program are under two years old, while Söderblom et al. focus on a program earmarked for firms in their first year.[3] Consequently, I focus on firms undertaking R&D, selected for feasibility or development projects, and younger than three years old at the time of treatment. At this age, firms in our sample are likely to be at the seed stage. The seed stage is generally defined as the period during which startups try to develop, test, and validate new ideas (Spender, 2014). It is often characterized by high levels of investment that significantly exceed the company's actual revenue. During this period, firms are considered more vulnerable to market failures and at a high risk of failure (Sarasvathy et al., 2014; Söderblom et al., 2015). Second, based on the findings of Czarnitzki and Delanote (2015), I include an independence criterion (excluding firms belonging to a corporate group). The authors show that subsidies have a greater impact on independent firms, as they tend to be more financially constrained. Third, all firms in our sample declared R&D expenses to tax authorities at least once during the observation period, ensuring they are innovative by an external standard. In France, only incremental and disruptive research can be declared for tax credit purposes, while adaptive R&D is excluded.[4]

[3] An alternative approach exists. Schneider and Veugelers (2010) use the European Commission's State Aid regulation definition, which includes firms up to ten years old. YICs are not a homogeneous group; their profiles and barriers vary significantly, especially across sectors and ages. While adopting such criteria allows the European Commission to maximize the inclusion of firms, it would also introduce greater heterogeneity within the sample, making identification more complex and increasing the risk of imprecision

[4] In France, the use of the R&D tax credit is widespread, minimizing concerns about selection bias (CNEPI 2021; Bozio, Irac, et al. 2019). In the present study, both the treated and counterfactual firms must have applied for the R&D tax credit at least once during the observation period, ensuring consistency. An alternative dataset is the Community Innovation Survey (CIS), managed by the European Union. However, using data from the R&D tax credit form, known as GECIR, provides two additional advantages. First, GECIR is exhaustive, covering all firms that benefit from the tax credit, whereas the CIS, particularly for firms with fewer than 250 employees, is based on a rotating panel and is therefore incomplete. Second, the sampling frame for the CIS focuses on potentially innovative firms, many of which are identified through their application for the R&D tax credit, adding another layer of selection.

The program is characterized by the limited size of the grants distributed to the targeted population, which excludes a potential liquidity channel to be at play. A liquidity channel occurs when a subsidy is large enough to significantly reduce the investment needed for a constant expected revenue. The average subsidy size granted to YICs in the IA program is €36,000, with 50% of grants below being €30,000. For comparison, the average seed-stage fundraising (Series A) in France was €473,000 in 2010 and €827,000 in 2020.

Table 2: Characteristics of Young Innovative Companies supported through IA program

	Mean	SD	Median	Observations
Total Asset	380	860	171	1061
Work Force	3.2	4.47	2	1061
Turnover	192	650	48	1061
Value Added	69	321	23	1061
Equity	129	283	31	1056
Debt	65	168	10	1049
Gross R&D	181	420	86	593
Subsidy - Flow	24	62	0	570
Subsidy - Stock	5	42	0	1046
Work Force R&D	2.4	2.74	2	505
R&D intensity	56	124	32	513
Intangible Intensity	33	98	7	813

Note: This table reports the average characteristics at the pretreatment level, data are extracted from the databases FARE and GECIR described in the following section and expressed in thousand euros

As expected, companies meeting the criteria appear to be innovative startups in the seed stage. By definition, all companies in the sample are innovative or will become so. Additionally, Table 2 shows that they make little or no profit before joining the program. On average, turnover before treatment is €192,000, with 17% of firms reporting no turnover at all. Their ratio of turnover to R&D expenditure is also very low, with a median of 0.9 and an average of 4.1, confirming that firms identified through the three criteria are still burning cash to invest in innovation—consistent with the seed-stage definition.[5]

3.2 Complementary data from the French National Institute for Statistics

Information provided by BPIFrance is merged with complementary data from administrative sources. The FARE database, provided by the National Institute of Statistics and Economic Studies (INSEE), processes information from companies' income tax returns. It offers an accurate view of firms' balance sheets, including details such as total gross assets, total workforce, turnover, profits, equity, and debt.

[5]For comparison, in the pharmaceutical industry—one of the most R&D-intensive sectors—the average R&D expenditure as a percentage of added value was 13% in 2021, according to the OECD

The second database, known as GECIR, compiles information collected through the R&D tax credit returns. In France, the scope of research expenses eligible for the tax credit is broad. It includes depreciation of fixed assets, personnel expenses, remuneration and compensation for employees who are authors of inventions arising from research operations, personnel expenses related to young doctors, operating expenses, costs of acquiring and maintaining patents, costs of defending patents, amortization of patents acquired for research purposes, expenses related to standardization, and subcontracting costs for research operations. Each of these categories is recorded separately in the database, making it an ideal source for analyzing R&D expenses. I use this database to obtain information on gross and net R&D expenses, as well as the total subsidies for R&D received by firms each year. Detailed definitions of each variable are provided in Appendix 1.

Finally, the LIFI database records all relationships between parent companies and their subsidiaries in France. I cross-reference these data with information from the GECIR database to create a proxy for firm independence, since group affiliation and the head of the group must be declared in the R&D tax credit return too.

4 Methodology

4.1 Overview

Examining the causal impact of subsidies on YICs' access to capital markets requires a methodology that accounts for both firms' self-selection in applying for subsidies and the public authority's selection decisions. If the same firm characteristics that influence these selection processes also affect R&D activity or market access, endogeneity may arise. To mitigate this risk, I employ a Difference-in-Differences design, preceded by Coarsened Exact Matching, to enhance comparability between treated firms and their counterfactual countrol group.

Nevertheless, working with YICs at the seed stage requires a key adaptation of the conventional matching and Difference-in-Differences approach. DiD partly relies on the parallel trends assumption, which serves as a critical identifying condition for addressing concerns about endogenous treatment

assignment. This assumption holds that unobserved factors influencing treatment—whether due to selection or self-selection in the case of research subsidy—are either time-invariant or evolve similarly across treated and control groups. When satisfied, it allows post-treatment differences in outcomes to be causally attributed to the treatment. However, in the case of Young Innovative Companies, verifying the parallel trends assumption is particularly challenging, as these firms, by definition have no past.

For this reason, very few studies have focused on startups at the seed stage. Most research has instead targeted more mature SMEs (Howell, 2017; Chiappara et al., 2022). Nevertheless, this gap is detrimental to our understanding of Young Innovative Companies, which are both essential to innovation and particularly vulnerable. Seed-stage YICs likely face different constraints and incentives than later-stage startups in the industrialization phase, which in turn differ significantly from those of established SMEs—with their proven products, collateral, and greater investment capacity. To my knowledge, two works have attempted before to address the question of subsidies distributed at seed-stage firms. Söderblom et al. (2015), study the Sweedish VINN NU program earmarked to companies in their first year of existence. To address potential selection and self-selection concern, they adopt a matching strategy that compares firms which qualified for the subsidy but were not selected with those that did receive it. By focusing on this near-final selection cutoff, they create two groups closely matched on both observable and unobservable traits, approximating random assignment. Access to detailed firm-level data further allows them to control for remaining differences and reduce concerns over unobserved heterogeneity.

Kerr et al. (2014) also adopted a similar approach. However, in the case of Bpifrance, this strategy would be less appropriate. Discontinuity-based comparisons—i.e., comparing supported firms with rejected but nearly accepted applicants—are valid when the grant-awarding body faces binding budget constraints, making it reasonable to assume that near-miss applicants had viable projects and capable management but were turned down due to limited funds or strategic priorities. In contrast, the IA program run by Bpifrance has repeatedly not reached its annual budget ceiling for over a decade. This undermines the validity of the discontinuity design, as rejected projects may have been turned down for substantive reasons rather than marginal funding constraints. As another option, Hottenrott and Richstein (2020) use non-applicant firms as a counterfactual group

for subsidized German start-ups, averaging 2.6 years old. They apply propensity score matching (PSM) and exact matching to estimate causal effects while addressing selection bias. Matching is based on observable characteristics, ensuring comparability through common support, calipers, and exact matches on key firm attributes. Treatment effects are then calculated and validated by testing post-match balance.

In this context, I propose an alternative strategy. Rather than testing whether matching has eliminated differences in subsidiability indirectly through parallel trends, I directly control for subsidiability and its influence on the treatment effect. First, during the matching stage, I include the pre-treatment stock of subsidies received by YICs to account for their historical access to public support—used here as a proxy for latent subsidiability. Second, in an additional specification of the DiD regression, I introduce yearly flows of subsidies as a time-varying covariate, capturing differences in subsidiability between individuals. If the estimated treatment effect remains consistent with and without the control, this suggests—ceteris paribus—that the matching procedure has effectively addressed potential endogeneity from both selection and self-selection into treatment, as differences in sustainability do not affect estimation of the treatment effect. In other words, it supports the claim that, within the matched sample, treatment assignment is orthogonal to unobserved factors affecting outcomes.

4.2 The Difference-in-Differences regression with Coarsened Exact Matching

A Difference-in-Differences estimator is employed to assess the impact of IA program participa- tion on firms' innovation activities and access to capital markets $Y_i(D)$. This method compares the outcomes for firms that receive subsidies $Y_{i,s}(1)$, or the factual state, with the outcomes they would have achieved without the subsidies $Y_{i,s}(0)$, or the counterfactual state. Since a firm cannot be observed in both situations—receiving and not receiving subsidies—the estimation of the alternative state poses a key challenge for evaluation. To address this, the counterfactual is derived through matching. Most DiD estimations use a two-way fixed effects estimator (TWFE), following the specification:

$$log(Y_{i,t}) = \beta_1 D_i + \beta_2 1(t - T > 0) + \beta_3 D_i * 1(t - T > 0) + \lambda_i + \mu_t + \beta_4 X_{(i,t)} + e_{(i,t)} \qquad (1)$$

i denotes the firms, t the calendar year, T the treatment year, D a dummy variable taking the value

1 if i participates in the program and zero otherwise. As it is common in the literature (Klette and Møen, 1999; Herrera et al., 2013; Howell, 2017), firm characteristics are controlled using individual fixed effects λ_i. μ_t is a time fixed effect that controls for time-specific unobserved heterogeneity. The only time-varying control introduced, $X_{i,t}$, is the total subsidies to R&D activities cashed per year.

An average impact of the program is estimated for the first three years of treatment (t-T $\in$[0,2]). The TWFE framework usually yields an unbiased estimate of the average treatment effect. However, recent studies have shown that TWFE may produce biased estimates in staggered treatment settings, especially when treatment effects might be heterogeneous over time and groups, as it can assign negative weights (Callaway and Sant'Anna 2021; Goodman-Bacon 2021; Borusyak et al. 2021). To mitigate this risk, I introduce an alternative estimator developed by de Chaisemartin and d'Haultfoeuille (2020) robust to treatment heterogeneity across groups and periods (hereafter CH model).[6] The methodology relies on the existence of switchers—entities that were not treated before but become treated in each period. Two main assumptions are expected to hold. First, some entities should maintain the same treatment status at any point in time. Here, the counterfactual group consists of never-treated units. The second assumption is a generalization of the common trends assumption: in the absence of the treatment, the evolution of the treated would have been the same as that of the counterfactual. To ensure the second assumption is satisfied, treated firms are matched with adequate counterparts. [7]

I use a Coarsened Exact Matching (CEM), a method within the Monotonic Imbalance Bounding (MIB) class of matching techniques. Exact Matching forms strata of treated and control units that are identical on a set of pre-treatment covariates X. Firms without a counterpart in their stratum are excluded from the matched sample. However, exact matches are difficult to obtain when covariates are continuous. To overcome this, coarsening is applied. Coarsening consists of grouping similar values into discrete categories and matching based on them. Even if it is less precise than simple

[6] In this context, heterogeneity is likely to arise from two main factors: sectoral differences and macroeconomic conditions. The impact of subsidies is likely to vary across sectors. For instance, sectors focused on hardware innovation face longer development phases, upfront costs to develop prototypes, and delays in revenue generation. Also, upscaling production in these industries often requires substantial new investments. Conversely, in software-based industries, scaling is relatively cost-efficient, especially in Information and Communication Technologies, due to the intangible nature of the product (Acemoglu and Cao, 2015; Howell, 2017; Forman and Goldfarb, 2020; Callender and Natouschek, 2020). In addition, the economic environment between 2010 and 2020, characterized by fluctuations in interest rates, search for yield, and the development of the venture capital (VC) segment, represents another source of heterogeneity that could affect the results (see Figure 2).

[7] A limitation of the CH estimator is its data-consuming nature. The estimate of the t+n temporal effect is based on firms observed in t(D)1, t(D) and t(D)+n, where D is the treatment date. Classical TWFE methodology only requires observing the individual twice. Despite the constrained nature of the CH estimator, access to fiscal data and the annual nature of the balance sheet allows us to have robust results on a limited sample of 1,568 firms.

exact matching, coarsening sets an implicit upper bound on the allowable imbalance for each covariate by defining these bins. One common strategy to do this, is to use predefined bins, which assign values to specific intervals $R_j \in [minX_j, maxX_j]$. This approach introduces threshold effects but allows for increasingly wider intervals as covariate values rise, aligning with the principle of diminishing marginal utility.[8]

I match the firms based on their size and financial characteristics (Table 3), while maintaining minimal control for R&D characteristics considering gross R&D expenses and stock of previous subsidy received. Specifically, R&D variables are categorized into three levels for the pre-treatment period: no activity (zero), some activity, and no activity declared (did not apply for research tax credit in t-1). Each stratum contains one treated firm and one counterfactual firm, designated as "perfect peers". To ensure robustness, I assess the balance between the treated and matched counterfactual groups through a Student's t-test at the pre-treatment level. Additional covariates, beyond those used for matching, are included in the test to confirm that firms are comparable on relevant observable characteristics commonly considered in related studies. Table 4 presents the results. The achieved balance is high, with p-values exceeding the commonly accepted p-value of 5% or 10% in the literature.

Table 3: Main covariates considered for the CEM and bins definition

Year	**Creation Year**	**Sector**	**Tot Asset**		**Turn-over**		**Debt**	
Exact	Exact	Exact	< 200	1	0	1	0	1
					< 50			
			<1000	2			<100	2
			<2000	3	<250	2	<300	3
			<5000	4	<700	3	>300	4
			<10000	5				
			<20000	6	<2000	4	NA	5

Note: variables expressed in thousands of euros, Sector - Naf 2 digits

Out of the 1,061 YICs treated, 784 have been successfully matched. The population has been pruned to exclude treated firms for which an appropriate counterfactual could not be found. Unmatched firms tend to be larger, with higher R&D expenses and better access to debt financing. As is often the

[8]More generally, Iacus et al. (2011b) explain that Monotonic Imbalance Bounding (MIB) methodologies often outperform Equal Percentage Bias Reducing (EPBR) methodologies, to which the more commonly found Propensity Score belongs. Specifically, MIB methodologies explicitly define the maximum allowable imbalance between the treated and control groups and prune the population as needed to achieve this balance. This results in well-matched counterfactual and factual groups. The pruning and matching processes in MIB methodologies are performed simultaneously, eliminating the need for iterative procedures to determine the appropriate extrapolation region and model specification required with Propensity Score Matching. Additionally, MIB methodologies rely on fewer assumptions compared to EPBR methodologies and also eliminate issues related to model dependency.

case in such studies, larger firms are generally more challenging to match. Appendix 3 displays details on unmatched firms. Consequently, the estimator derived reflects the Sample Average Treatment Effect on the Treated (SATT).

Table 4: Test of difference in mean distribution between the Treated and their counterfactual

	CF	**Treated**	**P-Value**
n	784	784	
Total Asset	215.58	228.98	0.371
	(289.48)	(302.87)	
Work Force	2.35	2.57	0.213
	(3.50)	(3.38)	
Turnover	156.81	135.01	0.356
	(556.39)	(356.91)	
Added Value	60.55	57.51	0.713
	(166.77)	(160.27)	
Equity	75.14	79.99	0.575
	(168.95)	(172.18)	
Debt	41.55	39.99	0.725
	(94.30)	(80.41)	
Debt intensity	3.03	2.55	0.525
	(15.13)	(14.41)	
Gross R&D	121.34	116.81	0.678
	(149.58)	(152.18)	
Subsidy - Flow	11.32	12.58	0.664
	(38.29)	(39.73)	
Subsidy - Stock	0.27	0.13	0.469
	(4.89)	(1.80)	
Work force R&D	1.94	2.14	0.232
	(1.95)	(2.36)	
R&D intensity	48300.19	43289.96	0.338
	(78863.06)	(51984.16)	
Intangible Intensity	22.08	22.70	0.864
	(76.97)	(38.85)	
Sector			1
Year			1
Creation Year			1

Note: All monetary values are displayed in thousands of euros. The tests of mean difference are performed with a student's t-test for numerical variables and a Chi-square test for qualitative variables.

Table 5: Distribution of the Subisdy Granted to matched YICs,, in €thousand

	Min	**1st Qu**	**Median**	**Mean**	**3rd Qu**	**Max**
Subsidies	1.5	24	30	36	35	960

Note: This table reports the distribution of IA grants for firms meeting our criteria. The information is drawn from the ADEME database and is expressed in thousand euros.

One additional difficulty in applying this methodology to Young Innovative Companies is that YICs under three years old are small entities in the making, meaning key variables, such as debt, frequently take a value of zero in the pre-treatment period. In the matched sample, 38% of firms had no debt before receiving the subsidy. On the other hand, equity does not present this issue, as French law mandates that firms hold some social capital at their creation. The presence of zeros in debt complicates its use in log-linear models, as the logarithm function is undefined for them.

This challenge is commonly encountered in the international trade literature. Helpman and Melitz (2008) suggest addressing it by separating the extensive and intensive margins. I follow their approach. First, I measure the intensive margin using the main DiD regression, considering only firms with strictly positive debt values. Simultaneously, I analyze the extensive margin of the program for firms that had no debt in the pre-treatment period. The extensive margin measures the impact of the treatment on initial access to debt. I use a linear probability model with both the TWFE and the de Chaisemartin and d'Haultfoeuille estimators. A linear probability model is preferred over probit since no staggered DiD probit methodology has yet been developed. [9]

4.3 The Identification of the Causal Channels at play

An ultimate methodological challenge to that study is to disentangle between the two potential causal channels at play. To that end, an identification strategy is defined before hand. First, specific attention is given to the timing of the impact. Then, the conclusions drawn in this first stage are validated by isolating the certification effect and the prototyping effect.

The timing of the impact is expected to differ significantly between certification and prototyping effects. A certification effect lowers the asymmetry of information. As emphasized by Söderblom et al. (2015), its impact is likely to be stronger soon after enrollment in the program, as it provides new information about the quality of the firm and the project. The positive effect of the signal generated by the firm's selection into the program will fade over time as the firms develop and new information arises. Conversely, a prototyping effect is expected to have a delayed impact. It relies on a decrease in the technical risk stemming from the additional investment made in R&D because of the subsidy granted, implying that further research needs to be conducted and the innovation must mature to create its effects. Therefore, as a first step, I introduce a dynamic event study framework in the regression to capture when program participation produces its impacts for t-T $\in$[0,5].

To confirm the presence of a selection effect, I examine the effect of the program selection before any

[9] Other solutions exist in the literature for handling high occurrences of zeros. Wooldridge (2009) suggests using the transformation $\log(1+\epsilon)$, where ϵ is zero or a small value, but notes this only works for limited zeros and is not normally distributed. For larger numbers of zeros, Wooldridge recommends alternatives to the log function. One common solution is the inverse hyperbolic sine (IHS) function, which can handle zero and negative values and behaves like the log function for large values. However, interpreting IHS results can be challenging due to uncertainties in converting estimates to marginal effects, especially for small values, where metrics (e.g., yen, euros) can influence outcomes (Norton, 2022). Hence, distinguishing between the intensive and extensive margins is a more suitable approach for this study.

subsidy has been given. As with most subsidy programs, the contractualization takes a few months. I isolate the treated firms that have been selected for the program in one calendar year and received funds the following year. For these firms, I define the treatment as being the selection in the program and verify whether a significant impact exists before they receive the actual grant.

Finally, I formally test for the presence of a prototyping effect by estimating the impact of the delayed extra funds allocated to R&D thanks to the BPI grant. If the increase in funds allocated to R&D thanks to program participation impacts access to the capital market, then the program relies, at least partly, on a prototyping effect. The main challenge is to observe the funds allocated to R&D due to program participation. I use two alternative measures. First, GECIR database provides the total amount of subsidies cashed per year. On this basis, extra-funds allocated to R&D thanks to the program participation is defined as the actual subsidies received over time up to the amount granted by BPIFrance. As a robustness check, I introduce an alternative measure. I use the non-parametric Difference-in-Differences of total funds allocated to R&D between the perfect peers obtained through our CEM. Here again, the amount is capped to the actual amount of grants received through the IA program. I then delay the increase in funds allocated to R&D by one and two years, and examine their impact on access to equity and debt. I remove the treated firms from the sample after they have exhausted the subsidy received from BPIFrance. I also remove firms from the sample after their first fundraising or debt raising following treatment. These restrictive hypotheses ensure the attributability of the measured impact. Results are consistent between the different proxies, validating the robustness of the approach. The proxies are interacted with the program participation and introduced in a TWFE regression following the specification:

$$\Delta Y_{i,t} = \beta_1 D_i + \beta_2 1(t-T>0) + \beta_3 D_i{*}1(t-T>0) + \beta_4 D_i{*}1(t-T>0)\Delta Extra.R\&D_{t\text{-}1} + \beta_5 D_i{*}1(t-T>0)\Delta Extra.R\&D_{t\text{-}2} + \lambda_i + \mu_t + e_{(i,t)} \qquad (2)$$

$\Delta Y_{i,t}$ denotes the log of equity and debt or a dummy variable taking value 1 if the firms access it for the first time after the treatment and zero otherwise when the impact considered is on the probability to access the capital market; $ExtraR\&D_{i,t-n}$ the lagged extra funds allocated to R&D thanks to the program participation, i the firms, t the calendar year, T the treatment year, D a dummy variable taking the value 1 if i participates to the program and zero otherwise.

5 Results

5.1 The average impact of the participation to the program

Subsidizing innovation is expected to have two types of effects: an incentive effect on the resources allocated to Research and Development activities and a final impact corresponding to the augmentation in innovative activity. Typically, the final impact is gauged through proxies like fluctuations in patenting activity or the introduction of new products into the market (Bronzini and Piselli, 2016; Smith, 2020). For Young Innovative Companies or small firms, the final impact may be assessed through firms' performance and survival (Czarnitzky and Delanote, 2015; Mulier and Samarin, 2021). However, since the primary focus here is not on the impact on innovative activity but rather on access to the capital market, the final impact is the variation in equity and debt for treated firms (Söderblom et al. 2015; Howell, 2017).

Table 6 shows the average impact of the treatment on the funds allocated to R&D, the incentive impact, during the first three years after the treatment, t-T$\in$[0,2]. I consider both the model from de Chaisemartin and d'Haultfoeuille (2020) and the conventional OLS-TWFE method. Following the selection in the program, the funding allocated to R&D increases by 35% per year. A ripple effect can also be observed. There is a significant impact on the net funds allocated to R&D, which are the total funds minus those from public aid. The presence of an impact on R&D activities precludes excluding the possibility of prototyping at this stage. However, while an impact of the program on R&D activity is necessary for a prototyping effect to occur, it is not sufficient. Its existence does not, in itself, suggest that the intensification of research activities following the treatment impacts the firm's access to the capital market.

In a second specification, I include the total annual subsidy received as a control variable to ensure that the observed treatment effect is not driven by differences in subsidy eligibility between treated firms and their counterfactuals, nor by support from other public programs.[10] These subsidy amounts are reported through the R&D tax credit form, meaning that only firms engaged in ongoing research activities are included when this control is applied. Consequently, firms either more advanced in

[10]For further discussion, see Section 4.1.

their research or not yet actively conducting research are excluded from the sample. For this reason, the main specification used to assess the impact on capital market access relies on the simpler CH model, which includes only fixed effects as controls. In that case, I also estimate a third specification, limited to firms that apply for R&D tax credits but without including the subsidy amount as a control. This approach provides an additional check on whether the treatment effect is driven by differences in subsidiability, further supporting the validity of the matching procedure in mitigating endogeneity from both observable and unobservable firm characteristics. Across all specifications, the results remain statistically significant, and the estimated treatment effect is significantly stable in magnitude.

Table 6: Average effect per year of the program participation, short term - tE[0,2]

		Gross R&D (1)		**Gross R&D** (2)		**Net R&D** (3)		**Net R&D** (4)
CH Model	35%	0.297 ***	32%	0.275 ***	22%	0.196 ***	26%	0.228 ***
		(0.078)		(0.077)		(0.074)		(0.085)
N		1937		1563		1666		1557
Switchers		636		536		562		532
TWFE Model	42%	0.354 ***	39%	0.332 ***	30%	0.259 ***	31%	0.267 ***
		(0.069)		(0.072)		(0.073)		(0.075)
N		2952		2465		2529		2456
Control				Yes				Yes

Note: This table reports regression estimates of the effect of participation in the program on funds allocated to R&D. Gross R&D corresponds to the total expense in R&D, net R&D to the expenses financed by private funds, so the total expenses minus the public money received to finance research activities. The specification follows equation 2 with a simple fixed effects model. It is run alternatively with a CH and an OLS model. Columns (2) and (4) add the total subsidies received as control variables, allowing us to ensure that the impact measured is well linked to the participation in the individual aid program and that the effect is not biased by uncontrolled differences in subsidizability between treated and counterfactual groups. R&D expenses are a flow, so the impact is the average increase in funds allocated to R&D per year for the period. The impact in % is given as previously by computing the transformation $e(\beta)$-1. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively

The treatment impacts access to the capital market. Regarding debt access, the treatment increases both the intensive and extensive margins. It nearly doubles the stock of debt compared to the counterfactual group for firms already having debt. Concerning the extensive margin, the treatment increases the probability of raising debt for the first time by 26%. For equity, the average increase is 86%. The size of this effect aligns with previous literature on the subject. Howell (2017) finds that grants from the SBIR program in the United States generate over 100% more VC investments in dollars and more than twice the number of VC deals for firms in the energy sector, with an average age of 9 years and a median age of 6 years.

Table 7: Average effect of the program on the access to capital on the short term, tE[0,2]

		Equity		Equity	Equity		Debt-Int		Debt-Int	Debt-Int	Debt-Ext	Debt-Ext	Debt-Ext
		(1)		(2)	(3)		(4)		(5)	(6)	(7)	(8)	(9)
CH Model	86%	0.620***	73%	0.548***	0.555***	91%	0.648***	78%	0.578***	0.579***	0.267***	0.281***	0.280***
		(0.060)		(0.094)	(0.093)		(0.118)		(0.174)	(0.144)	(0.024)	(0.054)	(0.061)
N		6147		1880	1880		3536		1278	1278	2090	448	448
Switchers		2159		663	663		1236		457	457	432	105	105
TWFE Model	77%	0.571***	60%	0.473***	0.478***	79%	0.582***	55%	0.441***	0.445***	0.313 ***	0.259 ***	0.258 ***
		(0.065)		(0.090)	(0.090)		(0.113)		(0.162)	(0.162)		(0.071)	(0.072)
N		6272		2920	2920		4216		2261	2261	2195	836	836
Control				Yes					Yes			Yes	
GECIR Sample				Yes	Yes				Yes	Yes		Yes	Yes

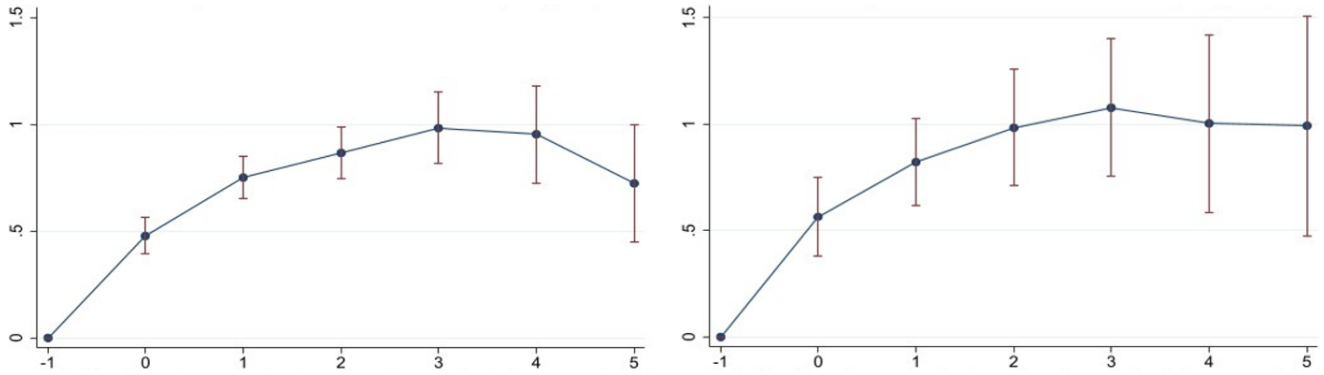
Note: This table reports regression estimates of the effect of the program participation on access to the capital market, both in terms of equity and debt. The specification follows equation 1. It is run alternatively with a CH and an OLS model. Columns (2), (5), and (8) add the total subsidies received as control variables, allowing us to ensure that the impact measured is well linked to participation in the individual aid program and that the effect is not biased by uncontrolled differences in subsidizability between treated and counterfactual groups. The intensive margins for debt correspond to the increase of debt for firms already having some while extensive margin is the impact of the treatment on the probability to first access debt. Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals over the period. The impact in % is given by computing the transformation $e(\beta)$-1 for the log treatment model and directly for the linear probability model. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively

The impact measured in percentage is higher for debt than for equity. This finding does not contradict the general consensus that Young Innovative Companies primarily finance through equity. Appendix 2 presents the impacts in volume. There, the effect is larger for equity than for debt, with an average gap of €T 72 for equity versus €T 48 for debt over the period. At the peak of the impact in t-T=3, the average increase in volume is €8.1 in the stock of equity and €5.1 in the stock of debt for every euro of subsidy granted. Moreover, as shown in Table 4, the average stock of equity already exceeds that of debt prior to the treatment. However, the higher percentage impact for debt indicates that the treatment has a relatively greater effect on this form of financing.

5.2 The Causal Channel at play in the BPI's support

Two causal channels could explain the observed impacts on access to the capital market: prototyping and certification effects. To distinguish between these two, I first examine the timing of the impact using an event-study version of the main DiD model. Event-study models are designed to analyze the effect of a specific event, such as the implementation of a public policy, by examining impact of the event on the dependent variables each year relative to the treatment year. If a certification effect is at play, the impact is expected to be stronger immediately following treatment, as the selection into the program introduces new information, which gradually fades over time as more information becomes available. In contrast, a prototyping effect relies on further R&D development to create a demonstrator or prototype, suggesting that the impact is expected to be deffered.

Figure 1: The evolution of the impact on access to Equity (left) and Debt (right) over time



Note: This figure reports regression estimates of the effect of the program participation on access to the capital market, both in terms of equity (left) and debt (right). The specification follows equation 1 with a simple fixed effects model. It is run with a CH model. Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals that modulates over time. Ninety-five percent confidence intervals shown.

As before, the regression analysis is conducted using TWFE and CH methods. For comparison, I introduce a third estimator developed by Borusyak, Jaravel, and Spiess (2023), hereafter referred to as BJS. Both CH and BJS models are robust to treatment effect variation across groups and time periods. The three methodologies converge until t-T=3 for funds allocated to R&D and t-T=4 for access to the capital market. This heightens the robustness of the results over the short to medium term.

Figure 1 shows that selection into the program initially leads to an increase in access to debt and equity during the treatment year, followed by another rise in year t-T=1. After that, the difference in the stock of equity and debt between the treateds and their perfect peers remains significant. The average impact continues to increase gradually until t-T=3, but the increase is not statistically significant compared to the average impact in the previous periods. The promptness of the effect aligns with the predominance of a certification effect.

To confirm the presence of a certification effect, I isolate a subsample of treated companies that were selected and received funds in different calendar years. As with any program, the contractualization process may take several months. Therefore, candidates applying later in a given year have a positive probability of being selected before the year ends and receiving the funds the following year. An

Table 8: Impact of the treatment on the access to capital over time

		Equity TWFE (1)		**Equity CH** (2)		**Equity BJS** (3)		**Debt TWFE** (4)		**Debt CH** (5)		**Debt BJS** (6)
Time to Treatment												
0	66%	0,508 ***	61%	0,478 ***	64%	0,492 ***	72%	0,545 ***	76%	0,565 ***	73%	0,547 ***
		(0,050)		(0,048)		(0,050)		(0,089)		(0,094)		(0,083)
1	119%	0,783 ***	112%	0,75 ***	113%	0,756 ***	139%	0,87 ***	127%	0,821 ***	140%	0,875 ***
		(0,066)		(0,065)		(0,065)		(0,103)		(0,117)		(0,106)
2	147%	0,906 ***	138%	0,865 ***	139%	0,872 ***	167%	0,982 ***	168%	0,984 ***	177%	1,019 ***
		(0,078)		(0,077)		(0,078)		(0,122)		(0,138)		(0,130)
3	164%	0,969 ***	167%	0,982 ***	166%	0,977 ***	192%	1,070 ***	194%	1,079 ***	213%	1,141 ***
		(0,089)		(0,088)		(0,091)		(0,138)		(0,158)		(0,149)
4	167%	0,983 ***	159%	0,952 ***	165%	0,976 ***	167%	0,983 ***	173%	1,003 ***	183%	1,042 ***
		(0,102)		(0,113)		(0,110)		(0,161)		(0,219)		(0,184)
5	139%	0,873 ***	106%	0,723 ***	125%	0,809 ***	119%	0,786 ***	170%	0,992 ***	125%	0,813 ***
		(0,110)		(0,144)		(0,121)		(0,188)		(0,276)		(0,229)

Note: This figure reports regression estimates of the effect of the program participation on access to the capital market, both in terms of equity and debt. The specification follows equation 1 with a simple fixed effects model. It is run alternatively with TWFE, a CH or a BJS model. Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals that modulates over time. The impact in % is given as previously by computing the transformation $e(\beta)$-1. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively

impact from selection into the program alone, prior to receiving funds, would confirm the presence of a certification effect. The companies concerned are re-matched by considering the selection date as the treatment date, rather than the fund disbursement date as previously. Seventy-five new perfect matches are created through coarsened exact matching, using the same specifications as before. Appendix 3 provides details on the balance of the new sample, and Table 9 shows the results. On average, selection into the program leads to a significant increase of 64% in equity and 57% in debt before receiving the treatment. This confirms the presence of a certification effect. The range of increases is similar to that observed in the full sample for equity, while it is 19 percentage points lower for debt, although the difference is not significant. Columns 5 to 8 also display a significant impact on the probability of raising capital.

A certification effect does not rule out, per se, the possibility of a prototyping effect. To formally test for its presence, I examine the impact of additional funds allocated to R&D thanks to the subsidies on the probability and volume of capital raised. The public funds allocated to R&D are measured either by the subsidies cashed over time or by the non-parametric difference-in-differences in R&D expenses between perfect peers, both capped at the amount granted by BPIFrance through the individual state aids program. Subsidies cashed are an exact measure and can be observed in the research tax credit form. Firms must declare them, as they need to be deducted from the calculation base of the tax credit. Additionally, I introduce the impact of total funds allocated to research.

Table 9: Certification effect - Impact of the selection in the program

	Equity Vol (1)	**Equity** Vol (2)	**Debt** Vol (3)	**Debt** Vol (4)	**Equity** Prob (5)	**Equity** Prob (6)	**Debt** Prob (7)	**Debt** Prob (8)
	0.497 ***	0.322	0.450 *	0.284	0.160 ***	0.115 *	0.168 ***	0.115 *
	(0.143)	(0.199)	(0.230)	(1.459)	(0.061)	(0.060)	(0.062)	(0.069)
Switchers	76		50		76		75	
N	319	304	228	225	319	304	317	300
CH	Yes		Yes		Yes		Yes	
TWFE		Yes		Yes		Yes		Yes

Note: This figure reports regression estimates of the effect of the program participation on access to the capital market, both in terms of equity and debt. The specification follows equation 1 for colums (1) to (4) and 3 for (5) to (8). It is run alternatively with TWFE or a CH model. The impact is measured for treated firms after they have been selected but before they received the subsidy. Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals over the period. The impact in % is given as previously by computing the transformation $e(\beta)$-1. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively

The variables of interest are lagged by t-1 and t-2 and interacted with the program participation. Table 10 shows a few significant results. Only the total funds allocated to R&D seem to impact the amount of debt raised. However, even when significant, the estimated impacts are close to zero. This confirms that, in the case of the Individual Aids program, the primary channel at play appears to be a certification effect, with no detectable prototyping effect.

Table 10: Prototyping Effect - Impact of the extra-funds allocated to R&D on the access to Capital

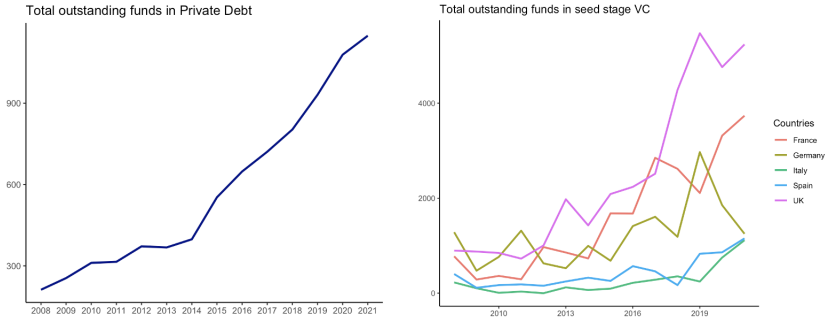
	Equity Proba (1)	**Equity** Proba (2)	**Equity** Proba (3)	**Equity** Vol (4)	**Equity** Vol (5)	**Equity** Vol (6)	**Debt** Proba (7)	**Debt** Proba (8)	**Debt** Proba (9)	**Debt** Vol (10)	**Debt** Vol (11)	**Debt** Vol (12)
Subv t-1	-0.002			-0.001			-0.002			0.003		
	(0.002)			(0.004)			(0.004)			(0.010)		
Subv t-2	-0.000			-0.002			0.005			0.028 *		
	(0.001)			(0.004)			(0.005)			(0.015)		
Diff t-1		-0.000			0.002			-0.000			-0,001	
		(0.001)			(0.001)			(0.000)			(0,001)	
Diff t-2		0.000			0.000			0.000			0,001	
		(0.000)			(0.002)			(0.000)			(0.000)	
Gross R&D t-1			0.000			0.000			0.003 *			0.012***
			(0.000)			(0.003)			(0.001)			(0.004)
Gross R&D t-2			0.001			0.003			0.001			-0.001
			(0.000)			(0.002)			(0.001)			(0.003)
N	7256	7256	7535	7225	7503	7225	6158	6158	6150	3842	3842	3839

This figure reports regression estimates of the interaction between the effect of program participation and the extra funds allocated to R&D due to public grants on access to the capital market. The specification follows equation 2. It is a fixed effects model integrating interaction terms between extra funds allocated to R&D due to program participation and the treatment as a control variable. This control is the main variable of interest, and the results are displayed here. The analysis is run with a TWFE model. The impact is measured for treated firms after they have been selected but before they received the subsidy. Capital is a stock; thus, the impact measured is the average gap in the stock between the treated groups and their counterfactuals over the period. Since the variable of interest is defined in R, the impact in percentage is given by computing $e(\beta)$ when the dependent variable is in volume and directly when using the linear probability model. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively

5.3 Impact heterogeneity over time

The observation period from 2008 to 2021 was marked by significant changes in macroeconomic conditions. Following two major crises (2007–2008 and 2010–2012), Europe experienced an extended

Figure 2: Evolution of outstanding funds in the private debt and seed-stage VC segments



Note : On the left, total outstanding funds in the private debt segment worldwilde in billions of euros, (AMF 2023); On the right, outstanding funds in the seed-stage VC segment millions of euro (Invest Europe)

period of zero interest rates. Zero-rate policies have been associated with a search-for-yield behavior, which fosters long-term investment and increases risk-taking (Kraüssl et al., 2017; Park and Song, 2024). As a result, the total outstanding funds in the private equity segment grew substantially during this time. Figure 2 highlights the growth of venture capital investments across Europe, particularly in France and the UK, alongside a global rise in non-bank lending or private loans. The years 2014–2015 mark an inflection point, with a significant acceleration in growth rates thereafter. The availability of funds in the venture capital segment directly influences startups' access to equity, while private loans affect their access to debt. Private debt refers to non-bank lending, where private lenders provide loans to businesses without traditional banking intermediaries. It primarily targets middle-market companies. This financing option addresses the needs of firms requiring capital but lacking access to traditional bank loans or public markets. It can complement equity raising by financing riskier projects while avoiding dilution of capital and decision-making power. However, data on private debt funds are limited, as this financial vehicle is relatively recent. As a proxy, I used the total outstanding funds in the global private debt segment, published by the French Financial Markets Authority (AMF, 2023). For venture capital, data on total outstanding funds were sourced from the Invest Europe dataset, the largest association of private capital providers in Europe.

The subsidies granted remain stable before and after the acceleration in total funds available in the relevant market (Table 11). Variations in the treatment impact cannot be attributed to changes in the policy's calibration. I first examine the heterogeneity in the impact of program participation before and after the 2014 take-off. No significant fluctuations are observed, although a shift in the

distribution of the impact, reflected in changes to the average size, can be noted. The average equity surplus for the first three years post-program integration is 51 percentage points higher in the latter period, with a 62 percentage point increase for debt. Conversely, the impact on R&D investments shows minimal fluctuation.

Table 11: Distribution of subsidies granted before and after 2014's take-off, in €thousand

	Min	**1st Qu**	**Median**	**Mean**	**3rd Qu**	**Max**
2010-2014	5.5	25	30	36	40	300
2015-2018	1.5	25	30	30	30	100

Table 12: Impact of the treatment before and after the take off on the VC segments

	Gross R&D (2010-2014)	**Gross R&D** (2015-2018)	**Equity** (2010-2014)	**Equity** (2015-2018)	**Debt** (2010-2014)	**Debt** (2015-2018)
CH Model	0.287 ***	0.309 **	0.471 ***	0.745 ***	0.419 ***	0.795 ***
	(0.084)	(0.146)	(0.070)	(0.103)	(0.147)	(0.162)
N	1327	524	3034	2891	1863	1541
Switchers	475	161	1086	1073	668	568
TWFE Model	0.348 ***	0.368 ***	0.442 ***	0.703 ***	0.504 ***	0.773 ***
	(0.079)	(0.141)	(0.076)	(0.105)	(0.141)	(0.173)
N	1873	1079	2972	2924	2200	2016

Note: This figure reports regression estimates of the effect of the program participation on access to the capital market, both in terms of equity and debt. The specification follows equation 1 with a simple fixed effects model. It is run alternatively with TWFE, a CH . Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals for the period. R&D expenses are a flow, so the impact is the average increase in funds allocated to R&D per year for the period. The impact in % is given as previously by computing the transformation $e(\beta)$-1. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively.

In a second set of equations, I include the interaction terms of program participation and total outstanding funds in the capital market within the main difference-in-differences equation. Treatment is interacted with total funds invested through venture capital when analyzing its impact on equity and with non-bank lending when assessing its impact on debt. I examine both the probability of raising funds and the volume of funds raised. Table 12 presents notable findings. When the availability of funds in the market is introduced, program participation systematically impacts the probability of raising funds (columns 3 and 4). However, the impact on the volume of funds raised shows greater variability. Treatment loses its significance for debt, and the magnitude of the impact decreases for equity. In contrast, total outstanding funds on the private market drive the volume of capital raised but do not affect the probability of accessing the market (columns 1 and 2). An additional €100 million in the seed VC segment in France increases the funds raised by treated firms by nearly

2%, while an additional €1 billion in the global private debt segment lifts the total amount of debt raised by firms by 0.1%. The more limited impact on debt is not surprising. First, the observed trend is global (based on worldwide estimates) and does not translate as strongly the local reality of YICs accessing debt in France. Second, this aligns with the risk profile of loan vehicles. Even when firms succeed, the earnings from a loan are capped. Consequently, the loan amounts granted reflect more the firms' predictable expected returns. Nevertheless, the correlation remains strongly significant. While these results are intuitive, they confirm that market conditions are a key driver interacting with subsidy programs. If program participation increases the probability of accessing capital markets, the actual level of extra-funds raised largely depends on market capacity. Thus, subsidy programs could adapt to the economic context and should be seen as an adjustment variable within a broader set of policies toward innovation, which could include other direct support programs and monetary policies.

Table 13: Impact of the program participation and the total available funds on the private market

	Equity Vol (1)	**Debt** Vol (2)	**Equity** Prob (3)	**Debt** Prob (4)
Treatment	0.261 ***	-0.204	0.108***	0.152 ***
	(0.0769)	(0.279)	(0.027)	(0.058)
Venture Capital	0.000192 ***		0.000018	
	(0.000047)		0.000014	
Private Debt		0.0011 ***		0.0001
		(0.0004)		(0.0001)
N	5896	4216	5234	4923

This figure reports regression estimates of the interaction between the effect of program participation and the funds available for on the private debt segment and the seed venture capital segments. The specification follows Equation 1, with total outstanding funds in the capital market included as an interaction term. Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals for the period. Since the variable of interest is defined in R, the impact in percentage is given by computing $e(\beta)$ when the dependent variable is in volume and directly when using the linear probability model. The impact of the treatment in % is given as previously by computing the transformation $e(\beta)$-1 when the regression follows a log-linear model. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively.

5.4 Robustness check

This section evaluates the validity of the results. Replication is one potential approach to conduct a robustness check. It consists of verifying whether the study's findings hold true across different samples. Another common approach is to test whether similar results can be obtained using an alternative methodology. However, due to the young age of the population of interest, few methods can credibly address selection bias and ensure an adequate level of balance between the treated pop-

ulation and their counterfactuals in the present experiment. This issue is discussed further in Section 4.1. For this reason, replication is preferred. A new sample is created using the same general CEM methodology. This time, firms are matched primarily on their R&D characteristics, with minimal consideration for financial characteristics. For financial characteristics, as in the main sample for R&D features, firms without debt or turnover are matched together, while those with debt or prior commercial activity are paired within the same group. This matching process results in the creation of 498 new peers. Detailed definitions of the new bins used for matching and information on the balance achieved are provided in Appendix 3.

Table 14: Robustness check - Results comparaison between the main sample and the replication

		Estimate	**SE**	**P-Value**	**LB**	**UB**
Gross R&D	Main	0.297***	0.078	0.000	0.144	0.450
	Rob	0.453***	0.132	0.000	0.195	0.712
SC	Main	0.620***	0.059	0.000	0.503	0.737
	Rob	0.557***	0.091	0.000	0.378	0.737
Debt	Main	0.648***	0.118	0.000	0.417	0.880
	Rob	0.642***	0.147	0.000	0.354	0.929

Note: This table reports regression estimates of the effect of program participation using two different samples: the main sample (main) and a second sample created for the robustness check (rob). The specification follows equation 1 using a simple fixed effects model. It is run using a CH model. For the results to be considered significantly similar, the confidence intervals, displayed through the lower and upper bounds (LB and UB), must overlap. *, ** and ***: Significance at the 10%, 5% and 1% level, respectively

Credibility in the replication process requires a substantial proportion of the sample to be newly observed firms not present in the original dataset. Among the 488 counterfactual firms used in the robustness check, 68% are newly observed, along with 8% of the treated firms[11]. This ensures the replication's robustness.

The magnitudes of the average impacts are consistent across both samples. While a difference is observed in the average impact on gross R&D funds, this disparity is not statistically significant. Interestingly, matching on research characteristics leads to an estimated average impact increase of 0.156, representing a 22 percentage point rise in R&D funds. Meanwhile, the average impact on capital market access remains stable. These results reaffirm the robustness of the findings under the replication process.

[11] 73% of treated firms were included in the initial sample, leaving few spare new treated firms to be included in the new sample

6 Conclusion

This study explores how subsidies can improve Young Innovative Companies' access to financial markets. The focus is on YICs supported by the "Individual Aid" program, a major innovation subsidy initiative of the French Public Investment Bank. Applicants considered are under three years old, at the seed stage, and receive relatively small grants—around €36,000 on average, with a median of €30,000. The findings show that subsidies significantly enhance these firms' ability to raise both equity and debt. This impact primarily results from the program's selection process, which signals firm or project quality and reduces information asymmetry—a phenomenon known as the 'certification effect'. However, the study finds no evidence that increased R&D spending allowed by the subsidy directly attracts external investors. Additionally, while the amount of capital in private capital market positively influences the volume funds raised by subsidized firms, participation in the program itself seems to be the key factor affecting the likelihood of raising capital.

These findings suggest that a "spray and pray" strategy, where public funds are distributed across many startups in the hope that a few will succeed without further investigation into their quality, may undermine the value of the certification label. Public and private funding appears to be more complementary, with private capital being a key factor in explaining the volume of additional funds raised following program participation, while only public support seems to affect the probability of securing funds. This leads to a potentially counterintuitive insight: the larger the total funds available in the venture capital segment, the higher the expected quality of the selected projects. A larger pool of outstanding funds in the private market leads to more capital being raised after the treatment, implying that the selected projects should yield higher returns.

Nevertheless, several limitations to the results should be considered. The findings do not imply that grants are ineffective or that only the selection process matters. In the short term, financial support can help firms survive, thereby contributing to the program's overall impact. Additionally, the funds provided may enhance the credibility of the selection process and signal public commitment to the firms. Furthermore, some firms may require larger subsidies. For instance, companies in manufacturing and hardware sectors could benefit from larger subsidies due to higher upfront costs.

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Appendices

Appendix 1 - Definition of the variables

Variable	Source	Definition
Equity	FARE	Share Capital – accounts 101 and 108 of the Balance sheet; and Issue premiums, merger premiums, contribution premiums account 104 of the balance sheet
Debt	FARE	Loans and similar debts, i.e, Convertible bond loans, accounts 161 and 1618; Other bond loans, accounts 163, 16883 and 1638; Loans and debts with credit institutions, accounts 164, 16884,512,514, 517, 5186, 519; Loans and financial debts, 162 165, 166, 1675, 168, 17, 426, 45. Repayable advance from public institution do not enter in those accounts.
Gross R&D	GECIR	Personnel expenses related to researchers and technicians, Remunerations and fair value for the benefit of employees, Personnel expenses related to young doctors, Depreciation charges on fixed assets, Other operating expenses, Depreciation charges on fixed assets, Depreciation allowances for acquired patents and plant varieties, Expenses related to standardization, Total subcontracting operations
Net R&D	GECIR	Gross R&D - Amount received from non-refundable or refundable public subsidies for the year + Amount of repayments of public subsidies for the year
Subsidy Flow	GECIR	Amount received from non-refundable or refundable public subsidies for the year
Total Asset	FARE	Total Gross Asset,i.e, Fixed assets (tangible, intangible,financial); Current assets ; Accruals and deferred income
Work Force	FARE	Average number of employees
Turnover	FARE	Total net revenue, accounts 70
Added-Value	FARE	Value added at factor cost; accounts 70+713+72+74+75-755-607-6087-6097-6037-601-602-6081-6082-6091-6092-6031-6032-604-605-606-61-62-6084-6085-6086-6094-6095-6096-65+655
Debt Intensity	FARE	Debt/Equity
Subsidy Stock	FARE	Investment subsidies – account 13
Workforce R&D	GECIR	Number of researchers and technicians involved in declared projects
R&D intensity	GECIR	Gross R&D / Number of employees
Intangible Intensity	FARE	Gross Intangible assets / Total Workforce
Sector	FARE	NAF 2 digits

Note: Accounts correspond to nomenclatures under the French ANC accounting regulation

Appendix 2 - Results in Volume

Table 15: Average effect of the program participation in thousands euros on the short term, tE[0,2]

	Gross R&D	**Equity**	**Debt**
	(1)	(2)	(3)
CH Model	15.340	72.38 ***	48.42 ***
	(13.95)	(24.10)	(17.31)
N	2372	6147	6155
Switchers	796	2159	2163
TWFE Model	20.92482	71.22 ***	52.35 ***
	14.0681	(0.21)	(0.14)
N	3416	5896	5903

Note: This table reports regression estimates of the effect of participation in the program in volume, i.e, thousand euros. The specification follows equation 1 with a simple fixed effects model. It is run alternatively with a CH and an OLS model. R&D expenses are a flow, so the impact is the average increase in funds allocated to R&D per year for the period. Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals over the period.*, ** and ***: Significance at the 10%, 5% and 1% level, respectively.

Table 16: Dynamic effect of the program participation in thousands euros

	Gross R&D BJS (1)	**Gross R&D** CH	**Gross R&D** TWFE (2)	**Equity** BJS	**Equity** CH (3)	**Equity** TWFE (4)	**Debt** BJS	**Debt** CH (5)	**Debt** TWFE (6)
0	29.97 ***	30.59 ***	22.14 **	18.08	26.19 **	28.95 *	16.42	23.68 ***	17.06
	(8.14)	(8.78)	(9.55)	(14.91)	(11.21)	(15.82)	(10.78)	(7.71)	(13.69)
1	45.20 ***	37.50 **	38.51 ***	68.00 **	73.43 ***	92.01 ***	42.22 **	48.67 ***	44.18 *
	(13.62)	(16.38)	(13.99)	(27.95)	(25.52)	(31.53)	(19.43)	(16.41)	(25.26)
2	50.96 **	39.61	41.95 **	112.80 ***	114.98 ***	147.78 ***	63.15	68.27 *	70.53
	(20.88)	(24.82)	(19.67)	(43.14)	(41.79)	(52.60)	(47.11)	(38.84)	(48.50)
3	50.41 **	60.53 **	37.86	293.15 ***	291.75 *	301.12 **	180.99 ***	183.92 **	178.65 **
	(24.29)	(25.38)	(23.65)	(132.10)	(155.90)	(136.39)	(73.99)	(74.64)	(75.33)
4	13.74	30.45	23.12	243.35 ***	233.93 ***	267.37 ***	197.38 ***	172.27 **	192.21 **
	(31.51)	(31.87)	(30.55)	(72.75)	(76.77)	(75.44)	(73.69)	(78.40)	(81.04)
5	8.21	32.05	12.22	252.18 ***	239.31 **	287.25 ***	241.15 ***	151.15	240.95 **
	(40.19)	(52.10)	(37.91)	(93.77)	(98.20)	(94.01)	(106.36)	(187.95)	(112.36)

Note: This table reports regression estimates of the effect of participation in the program in volume, i.e, thousand euros. The specification follows equation 1 with a simple fixed effects model. It is run alternatively with a CH and an OLS model. R&D expenses are a flow, so the impact is the average increase in funds allocated to R&D per year for the period. Capital is a stock; the impact measured is thus the average gap in the stock between the treated groups and their counterfactuals that modulate over time.*, ** and ***: Significance at the 10%, 5% and 1% level, respectively.

Appendix 3 - Additional Results on matching

Main specification - Larger treated firms are harder to match

Table 17: Test of difference in mean distribution between the Treated Matched and Pruned in the main sample

	Pruned	**Matched**	**p-test**
N	277	784	
Total Asset	851.26	228.98	<0.001
	(1513.30)	(302.87)	
Work Forcce	4.95	2.57	<0.001
	(6.32)	(3.38)	
Turnover	353.45	135.01	<0.001
	(1106.19)	(356.91)	
Added Value	103.04	57.51	0.043
	(567.46)	(160.27)	
Equity	268.34	79.99	<0.001
	(445.71)	(172.18)	
Debt	137.52	39.99	<0.001
	(291.07)	(80.41)	
Debt int	4.82	2.55	0.113
	(31.53)	(14.41)	
Gross R&D	315.46	125.18	<0.001
	(682.77)	(173.39)	
Subvention flow	43.34	12.58	<0.001
	(86.17)	(39.73)	
Subvention Stock	17.45	0.13	<0.001
	(80.83)	(1.80)	
R&D workforce	2.98	2.14	0.001
	(3.29)	(2.36)	
R&D intensity	80.26	43.29	0.001
	(19.69)	(51.98)	
intang_int	58.56	22.70	<0.001
	(169.76)	(38.85)	
Sector			¡0.001

Note: All monetary values are displayed in thousands of euros. The tests of mean difference are performed using a Student's t-test for numerical variables and a Chi-square test for qualitative variables. Variables are precisely described in Appendix 1.

Certification effect - Results of the matching

For the certification effect, the matching specification is the same as for the main sample. The variables taken into account and the bins defined are the same as in section 4.2. Only the treatment differs. For the certification effect, the treatment is the selection year, while for the main sample, the treatment is the year of contractualization when firms actually start receiving the grant. All firms considered to isolate the certification effect were selected in one year and treated the following year.

Table 18: Test of difference in mean distribution between the treateds and their counterfactuals for the certification effect

	Counter Factual	**Treated**	**p-test**
N	76	76	
Total Asset	223.37	247.67	0.730
	(329.77)	(515.45)	
Work Force	2.13	2.95	0.257
	(2.78)	(5.60)	
Turnover	184.61	243.76	0.595
	(346.92)	(905.04)	
Added Value	96.22	106.74	0.819
	(206.22)	(342.53)	
Equity	43.59	66.95	0.220
	(89.08)	(139.15)	
Debt	34.10	38.46	0.753
	(68.96)	(98.15)	
Debt intensity	1.94	2.48	0.563
	(3.74)	(7.25)	
Gross R&D	141.19	140.37	0.978
	(113.51)	(143.37)	
Subsidy - Flow	3.34	19.43	0.178
	(8.24)	(70.45)	
Subsidy - Stock	0.00	0.00	1.000
	(0.00)	(0.00)	
Work force R&D	2.24	2.73	0.381
	(1.64)	(2.70)	
R&D intensity	58.84	40.68	0.225
	(66.77)	(50.62)	
Intangible Intensity	24.47	16.87	0.410
	(54.17)	(37.84)	
Sector			1
Year			1
Creation Year			1

Note: All monetary values are displayed in thousands of euros. The tests of mean difference are performed using a Student's t-test for numerical variables and a Chi-square test for qualitative variables. Variables are precisely described in Appendix 1.

Robustness test - Results of the matching

To check the robustness of my results, I adopt a replication strategy. I examine whether the results differ significantly with a new sample. To obtain this new sample, I match my data following the same strategy but consider the firms' innovative profiles rather than their financial profiles. Specifically, I match based on their level of total assets, workforce, added value, and gross R&D expenses. I control for the minimum level of debt and subsidy received, only matching firms that have not received a subsidy prior to the treatment with other firms that have not received a subsidy, and firms without debt with other firms without debt. In the robustness check, 8% of the treated firms were not present in the main sample, and 68% of the counterfactual firms were different.

Table 19: Main covariates considered for the CEM and bins definition - Robustness check

Year	Crea Year	Sector	Tot Asset		Work Force		Added Value		Gross R&D		Intang Int	
Exact	Exact	Exact	<300	1	0	1	0	1	0	1	0	1
									<20	2		
			<1000	2			<20	2	<100	3	<1	2
							<70	3	<200	4	<8	3
			<2000	3	<20	2	<200	4	<500	5	<50	4
			<5000	4			<700	5	<1000	6	<70	5
			<10000	5			<1500	6	<3000	7	<150	6
			<20000	6			<4500	7	<7500	8	<500	7
			>20000	7	<55	3	>4500	8	<7500	9	<500	8

Note: variables expressed in thousands of euros, Sector - Naf 2 digits

Table 20: Test of difference in mean distribution between the treateds and their counterfactuals

	Counter-Factual	Treateds	p-test
N	488	488	
Total Asset	168.00	171.87	0.761
	(205.96)	(191.92)	
Work Force	1.88	1.96	0.625
	(2.54)	(2.70)	
Turnover	125.34	110.32	0.240
	(210.67)	(187.79)	
Added Value	41.09	43.95	0.672
	(106.36)	(104.84)	
Equity	61.65	59.08	0.766
	(155.22)	(108.96)	
Debt	36.00	32.37	0.400
	(71.48)	(62.73)	
Debt intensity	3.57	2.04	0.034
	(14.76)	(5.68)	
Gross R&D	91.50	82.00	0.482
	(121.32)	(112.06)	
Subsidy - Flow	11.46	8.55	0.479
	(38.82)	(29.79)	
Subsidy - Stock	0.77	1.20	0.582
	(8.07)	(15.36)	
Work force R&D	1.74	1.78	0.844
	(1.58)	(1.63)	
R&D intensity	36.05	32.912	0.561
	(44.37)	(41.57)	
Intangible Intensity	18.26	17.48	0.781
	(38.28)	(30.01)	
Sector			1
Year			1
Creation Year			1

Note: All monetary values are displayed in thousands of euros. The tests of mean difference are performed using a Student's t-test for numerical variables and a Chi-square test for qualitative variables. Variables are precisely described in Appendix 1.

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