Public funding and financial performance of entrepreneurial firms *

Katja Kisseleva
ESMT Berlin

March 4, 2021

Abstract

This paper empirically compares the financial performance of entrepreneurial firms after receiving public funding provided directly to entrepreneurs or through financial intermediaries. The within-firm event study and instrumental variable estimation show that firms invest most in human capital after receiving a grant, increase firm size most after receiving a loan, and generate the most revenues after receiving equity from government-owned venture capital (VC) funds. This variation is attributable to different financial instruments and the existence of governance elements in funding programs. I demonstrate that government-supported VC funds with the dual representation of both public and private interests have an adverse effect on firms. At the same time, firms backed by government-owned VC generate greater revenues and increased R&D activity compared to firms backed by private VCs. This represents an argument in favor of implementing a (pure) public investor program, rather than the government acting as a limited partner (LP) in private VC funds. My findings highlight the importance of highly skilled professional investors involved in the governance of entrepreneurial firms as a key element of effective public funding policies if their objective is to increase the commercialization success and/or R&D activity of firms.

Keywords: policy design, public funding, financial performance, entrepreneurship.
JEL codes: G11, G23, G24, G32.

*Email: katja.kisseleva@esmt.org. I thank Carl Gjersem, Marti Guasch, Bjørn Hermansen, Sabrina T. Howell, Niklas Hüther, Aksel Mjøs, Maximilian Müller, Per Olsson, David T. Robinson, Henry Sauermann, Ariel D. Stern, Ulrike Thürheimer, Zhen Ye and seminar participants at ESMT Berlin and Frankfurt School of Finance and Management for their helpful comments.

1 Introduction

It is often argued that entrepreneurs generate various economic benefits and are catalysts for economic growth and innovation. The supply of financing to such ventures is, therefore, essential for the entire economy. Part of the difficulty of raising capital relates to information frictions and moral hazard (e.g., Amit, Brander, and Zott, 1998). It is challenging for outside lenders and investors to distinguish potentially successful business proposals from less promising ones, which might lead to market imperfection in the form of private under-investment in these firms. In order to correct the private investment distortion, policymakers intervene directly in the entrepreneurial process with various public funding policies (Lerner, 1999). However, it can be difficult to evaluate the effectiveness of these interventions due to spillover effects or "soft" social benefits (e.g., Bai, Bernstein, Dev, and Lerner, 2021).

This paper tackles the effectiveness of various policy designs by measuring the financial performance of entrepreneurial firms after receiving public funding. This micro approach helps in understanding the way recipient firms utilize public money and whether it aligns with governmental objectives for establishing a funding program. In particular, I empirically compare the financial performance of firms after receiving public funding provided directly to entrepreneurs or through financial intermediaries, who in turn fund ventures. Both funding routes have a positive effect on innovative entrepreneurial firms. While financing intervention at the firm level can reduce private capital search costs for promising investments, a financing policy at the investor level may reduce the investment hurdle in such firms. Given their expertise, professional investors are arguably better than governmental employees at solving adverse selection challenges in identifying promising firms (e.g., Brander, Du, and Hellmann, 2015). However, they may not be as attuned to the broader objectives of a government, such as promoting certain technologies and knowledge spillover. These social objectives may imply that the government's investment hurdle is lower than that of a private investor. In turn,

if a government directly provides entrepreneurs with funding, a greater fraction of the entire funding budget reaches more entrepreneurs who need financing; however, more (taxpayer) money might be wasted on poorly chosen entrepreneurs (Lerner, 2020).

I exploit unique administrative data provided by the Norwegian Tax Authority and the governmental agency Innovation Norway and simultaneously compare four actual public funding programs established in Norway. Public grants (Grant) and public loans (Loan) are provided directly to the entrepreneur (DE programs), while financial intermediary (FI) programs include government-supported (GSeed) and government-owned (GVC) VC funds. The study is thus informative about the governmental funding in Norway, with potential additional applications to programs with similar design more generally. While entrepreneurial firms are the central focus of this paper, I believe that the micro-economic comparison of public funding designs is relevant in terms of broader aspects, such as during a financial or economic crisis when governmental intervention is considered.

To measure financial performance, I use an accounting measure of profitability— return on assets (ROA), which measures firm efficiency. In contrast to total factor productivity (TFP), which is commonly used in economics and finance literature (e.g., Chemmanur, Krishnan, and Nandy, 2011; Pless, 2020), it also takes into account the product-market response to the firms strategy. I disaggregate ROA into its components — earnings, earnings before interest and taxes (EBIT), and firm size measured as total assets — and look separately at revenues and personnel expenses, which are two items included in the EBIT, as well as at intangible assets as an item included in total assets, which represents capitalized R&D activity on the firm's balance sheet. This disaggregation makes it possible to align my findings to previous literature that looks at revenues or employment (e.g., Puri and Zarutskie, 2012). It also allows me to infer conclusions about the alignment of firm performance to broader governmental objectives, such as increases in R&D activity, employment, or commercialization

of firm activities.

My analyses show that FI programs select firms with lower profitability— driven by lower earnings, not greater firm size— than DE programs. However, low (negative) earnings are not necessarily an indicator of poor quality, as firms with such earnings might have high investment activity. While I do not observe any differences in R&D activity, as proxied by intangible assets, firms invest more in human capital before being selected by FI programs than by DE programs. In addition, FI programs select firms with substantially higher levels of raised equity from private sources, which, assuming that the private market invests in the best firms, speaks against the poor quality and for the high investment activity argument. In addition, the results reveal that financial intermediaries with private market actors (GSeed and private VC) select similar firms but differ when compared to a pure government-owned fund, GVC. In particular, GVC selects larger firms with the most expenditures— among them with the highest personnel expenses—, with more revenues already generated, and with the most private non-VC equity raised.

Given the differences in the selections into public funding programs, I utilize a within-firm event study model to compare the effects of DE and FI programs on the cumulative change in the financial performance of a firm since its inception. The use of change variables allows for the comparison of the public funding's impact on firm development regardless of their observable characteristics before public funding. It is unlikely that government-employed individuals or even asset managers can ex-ante comprehend and/or forecast change in firm performance accurately due to the inherent uncertainty entrepreneurial innovative firms bear (e.g., Kerr, Nanda, and Rhodes-Kropf, 2014).

In addition, I instrument every allocated public funding amount through program X received by firm A with program's X remaining budget before allocating the funding amount to firm A. My instruments are correlated with the endogenous public funding amounts. If

more budget is left, the probability is higher that firm A will be selected into the program, and if so, it can receive a larger funding amount. The remaining budget of program X consists of two components: aggregate governmental capital supply and funding amounts already allocated to other firms. The exclusion restriction holds if these components are exogenous from the micro-level financial performance of firm A. The decision to select a firm into a program is independent of the financial performance of all other firms that might consider applying for this program. The aggregate capital supply is governed by the politics, and there is no indication that it is a response to growing investment opportunities or to aggregate growing capital demand.

My analyses show that ROA decreases for all firms after receiving any type of public funding. The negative effect is driven by the persistent decreases in earnings and not by the firm size. Furthermore, the effect is larger for FI firms than for DE firms. However, after disaggregating earnings into the components, it is not possible to derive a generalized statement about the superiority of one public funding route over another. In particular, firms invest most in human capital after receiving a grant (most personnel expenditures), their assets grow most after debt financing is received (both intangible assets and total assets), and the most revenues (economically and statistically significantly) are generated after they receive equity from GVC funds. Thus, there is need for a more nuanced view of separate programs that considers incentives imposed on the entrepreneur by the financial instrument itself, the existence of the governance element in the program design, and the specific governmental objective behind establishing this public funding program.

I demonstrate that government-supported VC funds (GSeed) with the dual representation of both public and private interests have an adverse effect on firms compared to the portfolio companies of VC funds with a single representation of either private or public interest. Firms that receive GSeed funding have the lowest increases in revenues and invest

less in human capital and R&D activity. Thus, the question of whether the way these firms utilize the received funding aligns with any governmental objective arises. At the same time, firms backed by GVC generate greater revenues and increased R&D activity compared to firms backed by private VCs. This represents an argument in favor of implementing a (pure) public investor program rather than the government acting as an LP in private VC funds. These findings highlight the importance of highly skilled professional investors involved in the governance of entrepreneurial firms as a key element of effective public funding policies if their objective is to increase the commercialization success and/or R&D activity of firms.

In addition to firm financial performance, I analyze which program design is able to unlock additional equity from the private capital market. The analyses show that all programs lead to an increase in private VC and non-VC equity, though FI programs send a stronger signal to private investors than DE programs. At the same time, I provide evidence that private VCs discount firms in future financing decisions for receiving GSeed funding instead of private VC funding. In contrast, non-VC investors make no such discrimination — the increase in non-VC equity after GSeed is not economically and statistically significantly different from the increase after private VC.

Empirical analyses in prior studies commonly utilize program evaluations, which involve picking a single program in isolation and questioning whether it achieves its objectives. While some analyses find positive effects of DE programs (e.g., Jones and Williams, 1998; Lerner, 1999; Howell, 2017; Azoulay, Graff Zivin, Li, and Sampat, 2018), others do not find any evidence of these (e.g., Wallsten, 2000; Gans and Stern, 2003; Lee, 2018). For FI programs, Leleux and Surlemont (2003) provide evidence that GVC programs cause greater amounts of money to be invested in the industry as a whole. Brander, Du, and Hellmann (2015) show that this additional investment leads to a positive effect on firms' exits. In the angel investment context, Denes, Howell, Mezzanotti, Wang, and Xu (2020) confirm that

angel investor tax credits increase angel investments. However, they find no significant effect on state-level entrepreneurial activity. On the micro level, Alperovych, Hübner, and Lobet (2015) provide evidence that GVC-backed firms are less efficient than both private VC- and non-VC-backed firms.

This paper diverges from the program evaluation approach and contributes to the literature on the interplay of entrepreneurship policies. Hellmann and Thiele (2019) theoretically evaluates several policy designs and concludes that funding subsidies are the optimal policy, implemented by either subsidizing investments or subsidizing returns. Bai, Bernstein, Dev, and Lerner (2021) examine 755 programs in 66 countries and show evidence suggesting that public and private funding for entrepreneurial firms are complementary, enabling mitigating frictions that arise in the deployment of capital to early-stage firms. Pless (2020) analyzes the interdependency of direct R&D subsidies and tax incentives and finds that these are complements for small firms but substitutes for larger firms. The author shows evidence that this subsidy-interaction effect results in improved firm productivity.

The present study also contributes to the sparse evidence in relation to the financial performance in entrepreneurial firms. Puri and Zarutskie (2012) show that VCs tend to invest in firms with no immediate revenues; however, if there are sales, VC-financed firms have larger revenues than non-VC-financed firms at each point of the life cycle. This size difference increases with firm age. At the same time, VC-financed firms initially have a lower payroll margin than non-VC-financed firms and continue in this way until their firm exit. Hand (2005) and Armstrong, Davila, and Foster (2006) provide a few descriptive statistics of financial statement variables for samples of pre-IPO VC-backed firms, while Sievers, Mokwa, and Keienburg (2013) do so for the sample closest to that of this paper—firms that receive an equity investment from a public bank's VC program in Germany.

This paper also connects to the question of relevance of funding sources for the firm

output. To my knowledge, Babina, He, Howell, Perlman, and Staudt (2020) is the only paper that explicitly addresses this question. They provide causal evidence that, in the U.S. university setting, privately funded research outputs are more often commercialized (patented) while federally funded research outputs are more likely to end up in high-tech startups founded by graduate students.

The rest of this paper is structured as follows. Section 2 provides the institutional background, and Section 3 describes the data and the sample. Section 4 compares firm characteristics prior to selection into funding programs. Section 5 compares the change in firm performance before and after receiving public funding, while Section 6 draws the conclusion.

2 Institutional background

The Norwegian government is the forerunner among all developed countries in terms of general government spending per capita, as shown in Figure 1. In addition, Norway's economic structure and the relative importance of private capital markets are similar to those in other advanced Western economies. The average size of the private VC sector in per capita terms ranks second in Europe — behind only Sweden — and fifth globally-behind the U.S., Israel, and Canada, see Figure 2.[1] Thus, it is reasonable to expect that lessons learned from the governmental intervention in Norway can be generalized to other economic settings.

Insert Figure 1 here.

Insert Figure 2 here.

[1]Further background on the Norwegian innovation system and startups can be found in Hvide and Jones (2018)'s Appendix V.

In particular, I evaluate the four biggest direct public funding programs established at the national level with a focus on financing domestic entrepreneurial firms or financial intermediaries to fund them: the government-supported VC program, GSeed, and government-owned VC program, GVC, on the FI level (FI programs), and Loans and Grants on the entrepreneur level (DE programs).[2] I do not consider R&D subsidies as they are provided as tax relief to all firms in Norway, which, for the most part, has no immediate effect on young firms that have negative earnings.[3]

GSeed is a government-supported VC program that has experienced several generations of funds over time. Following the annual budgetary parliamentary decision(s) to establish a new generation, the Ministry of Trade and Industry plans the overall structure of the financing program, including the number of funds and their requirements. The parliament expects to recover the invested money with adequate returns within 10-20 years. The governmental innovation agency Innovation Norway handles the practical issues related to the setup of individual funds by evaluating, selecting, and negotiating with external VC management firms that are in turn responsible for raising private capital for the funds. There is a 50%-50% ownership split at the fund level between public and private investors, while the split of returns is 55%-45%, which implies that the government compensates 5% of the losses of private investors in these funds. The governmental capital is made available for investment upon the signing of a contract with the VC management firm. The government states that the program's objective is to stimulate the private capital market to provide equity to newly established firms.

The GVC fund program is 100% owned by the Norwegian government and is set up in

[2]Bai, Bernstein, Dev, and Lerner (2021) and Lerner (2020) describe governmental funding programs around the world, which allows me to infer that these four programs are the most relevant ones.

[3]For the effects of various R&D support schemes, refer to Nilsen, Raknerud, and Iancu (2020) and Pless (2020). Färnstrand Damsgaard, Hjertstrand, Norbäck, Persson, and Vasconcelos (2017) theoretically and empirically explore the trade-off between R&D versus commercialization policies.

an evergreen structure with no requirements on the timeline of any dividend payments. It is financed by three grants from the government, which were parliamentary decisions based on annual budget proposals by the Ministry of Trade and Industry. These grants are handled by the ministry and made available for investments in tranches on call. GVC is managed by private equity professionals and invests on the same terms and conditions as private VCs with the stated exit strategy for each investment. The government does not influence the investment strategy; however, investments only involve Norwegian companies that have a maximum government ownership stake of 49%. The government's goal for establishing this program is to secure better capital access for innovative Norwegian firms. In this paper's sample, 15% of FI-treated firms receive public funding through the GVC program, which is almost identical to 14% in Brander, Du, and Hellmann (2015).

Through the DE route, Innovation Norway awards risk loans (Loan) to entrepreneurial firms that are unable to finance innovative projects through bank loans on regular terms. Innovation Norways entrepreneurship grants (Grant) are supposed to provide entrepreneurs with critical liquidity for innovative products that do not exist in the market. A numerical algorithm assigns an applicant a score based on their financial information. Applicants are automatically not approved for the grant if they are below a pre-defined score threshold, while approval for firms above the threshold is based on a positive qualitative judgment. This program design is similar to the Small Business Innovation Research (SBIR) Phase I R&D grants, as described in Howell (2017). The annual budget proposals for public grants and loans are made by the Ministry of Trade and Industry, while the subsequent budget decision is made by the parliament. These are non-rolling annual budgets, which implies that the allocated budget is spent in that particular year. Figure 3 provides an overview of the aggregate governmental capital supply to the four programs and its allocation to

entrepreneurial firms over time.[4]

Insert Figure 3 here.

Table 1 provides an overview of the financial incentives of different market actors involved in these four public funding programs. The fact that both FI programs are run by professional investors with expertise and have financial incentives similar to those of private VCs reinforces the government's argument that the selection of target firms through FI approximates the selection of the private capital market. At the same time, if the target firm's social return is positive but its financial return is negative, the presence of financial incentives conflicts with the broader governmental objectives. In contrast, governmental representatives in both DE programs lack financial incentives compared to private investors, so they might allocate funds to socially, rather than commercially, promising firms.

Insert Table 1 here.

3 Data and sample

Norwegian administrative data, which are generally considered high quality and detailed, have been used prominently in labor economics, finance, and innovation.[5] I base my analyses on the comprehensive micro-level administrative data provided by the Norwegian Tax Authority and the governmental innovation agency Innovation Norway. My data set combines data from tax declarations, firm financial accounts, and several national corporate registries, as well as a governmental aid overview by Innovation Norway.[6]

The sample consists of firms that have received public funding aimed at supporting entrepreneurial firms through any program discussed in the previous section. These firms

[4] A detailed overview in million NOK (MNOK) is shown in Table A1.
[5] For recent examples, see Hvide and Jones (2018) and Meling (2020).
[6] For a detailed description of the data, see Kisseleva, Mjøs, and Robinson (2020).

may receive funding multiple times and from different sources. The information about firms in DE programs comes from the governmental aid overview provided by Innovation Norway. Firms that receive public money through a FI program are identified in the administrative ownership data through GVC and GSeed fund-name matching. The sample consists of 2,196 firms founded between 1995 and 2016, which have received public funding of at least 5,000 NOK 3,560 times in the period of 2005-2017. FI programs have allocated governmental money 494 times (GSeed: 373, GVC: 121) in this period, while DE programs have provided capital 3,066 times (Loan: 853, Grant: 2,213). Additionally, 69% of firms receive some public funding only once, 18% twice, and 13% at least three times. Furthermore, 70% of firms receiving public funding only once do so through a public grant, implying that almost half of the sample receives solely "cheap" money without any reporting obligation or requirement of repayment. This may result in a lack of interest by the entrepreneur to use this money for firm operations. In the following analyses, I separate $Grant_{only}$ as an additional quasi-program that might capture the differences in firms applying for public grants.

In addition to public funding, the sample firms have received private VC equity 748 times.[7] I include private funding by VCs in my analyses for two reasons. First, the previous literature provides evidence that firms exhibit more success-related patterns after a VC investment (e.g., Chemmanur, Krishnan, and Nandy, 2011; Puri and Zarutskie, 2012; Bernstein, Giroud, and Townsend, 2016). I attempt to separate the effect of public funding by controlling for private VC investment. Second, instead of the costly establishing of specific public funding programs, a government can become a regular LP in private VC funds in order to provide entrepreneurial funding. Including private VC financing as a separate funding event allows me to contrast public funding programs with a private funding mechanism,

[7]VC equity includes independent VC funds, corporate VC, and incubators.

which could be an alternative to a governmental intervention.

Figure 4 shows the firm age distribution when receiving public (and private VC) funding. GVC funding is provided one year later than funding from all other sources (median ages of five and four years, respectively). At the same time, the age distribution of DE programs is slightly shifted more to the right than that of FI programs. On average, firms receive private VC and government-supported GSeed financing earlier than financing from purely public sources.

Insert Figure 4 here.

More than 8,000 MNOK are allocated directly to entrepreneurs, while 4,000 MNOK are allocated through financial intermediaries.[8] Taken together with the number of funding events, this supports the policymaker's argument that DE programs are more efficient in distributing public funds to a broader base of entrepreneurs in need of financing. However, there is variation in the funding amounts among programs, even within the same route. Figure 5 reveals that the largest amounts are allocated by the GVC program (the median treatment is 8.33 MNOK), while the smallest are allocated by the Grant program (0.7 MNOK for Grant-only firms and 1.33 MNOK for Grant firms with further financing), while the Loan and GSeed programs are in between (2.00 and 2.6 MNOK, respectively). However, there is some right skewness in the public funds allocation, with each average amount being 1.5-2 times as high as the median amount. The skewness is more pronounced in the allocation of private VC funding.

Insert Figure 5 here.

[8]The average NOK/USD and NOK/EUR spot exchange rates over this period are 6.40 and 8.23, respectively.

Figure 6 illustrates the occurrence of different combinations of public (and private VC) funding sources within a firm. The majority of firms selected into DE programs receive funding from only one source. A combination of Grant and Loan is not uncommon; these firms also receive private VC financing. The most frequent occurrence in FI-backed firms is funding either from a single source or in combination with private VC financing. The latter implies that financial intermediaries with private and public interests syndicate their investments (Hochberg, Ljungqvist, and Lu, 2007).

Insert Figure 6 here.

Figure 7 provides an overview of funding sequences from different public and private sources. If constructed in the order of most frequent source-pair occurrence, the stylized sequence of all funding sources would be Private VC—GSeed—Grant—GVC—Loan. However, there is substantial variation in sequences for different firms; thus, the results of my analyses should not reflect the fact when a firm is subsidized.

Insert Figure 7 here.

4 Selection into public funding programs

The first step toward the comparison of public funding designs is the analysis of differences in the selection of firms into DE and FI programs. In particular, I evaluate the observable financial performance of firms one year before selection. I expect that private VCs select firms with the greatest potential to innovate and succeed (e.g., Egger and Keuschnigg, 2015) as these are professional asset managers who leverage their expertise. If the government's objective is to provide financing to promising entrepreneurial firms that are unable to get sufficient private financing, firms selected by a governmental program should

be ex-ante slightly "worse" than firms selected by private VCs, even if the selection ability of a governmental program is as good as that of a private VC firm. I assume this is the case for FI programs, as these are run by professional asset managers as well. The selection ability of DE programs is arguably better than that of FI programs because they are run by governmental employees.

Table 2 provides descriptive statistics of the financial performance of sample firms one year before selection into a public funding program. All firms show a negative profitability ratio: return on assets (ROA).[9] The ROA is lower before selection into FI programs than before selection into DE programs, both in average and median terms. This is not necessarily the result of selection related to age, as Figure 4 indicates. The lower profitability of a median firm before FI (and equally private VC) selection partially results from the bigger firm size, measured in total assets. However, there is a substantial right skewness in the firm size distribution, especially before DE selection. In addition, firms before FI (and private VC) selection exhibit larger negative earnings (EBIT) than firms before DE selection. This is partially driven by lower revenues and higher personnel expenses, which is in line with previous findings by Puri and Zarutskie (2012). Additionally, these firms have higher levels of intangible assets, indicating higher R&D intensity in firms selected into FI programs (and private VC investment) than those selected into DE programs. This descriptive evidence suggests that the financial characteristics FI programs focus on are similar to those of private VCs. The last two columns of Table 2 describe the amount of private VC and non-VC equity raised before selection into a public funding program. The median firm before DE selection does not have private VC financing and has raised substantially less non-VC equity than a median firm before FI selection or a private VC investment.

Insert Table 2 here.

[9]ROA is calculated as $ROA_{i,t} = \frac{NetProfit_{i,t} + FinancialExpenses_{i,t} * ((1-\tau) * PretaxProfit_{i,t})}{(TotalAssets_{i,t} + TotalAssets_{i,t-1})/2}$.

The governmental selection objective may be a result of political interest to foster a certain industry or region.[10] Moreover, the financial performance is a function of a firm's developmental stage. In order to account for these differences, I run a cross-sectional OLS estimation of the following linear model:

$$Y_{ijt} = \alpha + \sum_{j=Grant}^{j=GSeed} \beta_{1j} Funding_j + \beta_2 Private\ VC_{it} + \beta_3 Gov\ Supply_t + \tau_i + \gamma_{it} + \varepsilon_{ijt} \qquad (1)$$

The dependent variable Y_{ijt} is a firm i financial performance characteristic in the year t, which is one year before selection into the public funding program j. The program-firm-year level of analyses allows for multiple funding events at different points of time to be accounted for; one firm is included several times if it receives several public funding amounts either from the same or from different funding sources. The dependent variable is winsorized at the 1^{st} and 99^{th} percentiles. With the exception of ROA, which is a ratio variable, I transform other measures (after winsorization) into $Ln(Y_{ijt} + 1)$. $Funding_j$ is four dummy variables receiving a value of one if the firm receives public funding through DE or FI programs. The program category $Grant_{only}$ is omitted. In addition to public funding programs, I include the dummy variable $Private\ VC$ to compare financial performance before selection into FI programs to financial performance before selection by private VC investors. $Gov\ Supply_t$ is a control variable for the aggregate governmental capital supply variation over time as increased capital availability may lead to a quality/risk shift in the selection process. τ_i are firm region and industry fixed effects, while γ_i is the firm age fixed effect. Standard errors are clustered at the firm level to account for the serial correlation in the dependent variable (Bertrand, Duflo, and Mullainathan, 2004).

Table 3 shows that, independent from the aggregate governmental capital supply,

[10] For the distribution of funding allocation across industries and regions, please refer to Figures A1-A2.

industry, region, and firm age, FI programs select firms with a lower ROA compared to DE programs. The ROA of firms before FI selection is 15 percentage points lower than the ROA of firms before selection into the Grant program, which, in turn, is 15 percentage points lower than for firms before Loan funding (or the Grant as a single funding source). However, the firm size measured in total assets is limited in explaining this difference as only firms prior to receiving GVC funding are statistically significantly larger than other firms, not those prior to GSeed funding. The difference in ROA between FI and DE programs is driven by the difference in EBIT. Firms before DE selection are at least double as much less unprofitable than firms before FI selection. Furthermore, along this dimension, GVC selects firms with the largest negative earnings among all firms. The earnings pattern is not necessarily driven by revenues; there is variation within FI and DE routes. While in line with previous literature, GSeed exhibits the lowest revenues and GVC selects firms with the highest revenues. Among DE programs, the Grant selects firms with revenues that are 57 percentage points lower than those of firms selected by the Loan. When it comes to personnel expenses, FI programs select firms that invest more in human capital. In particular, GVC selects firms with almost five times as much personnel expenses as DE-selected firms. I do not observe any differences in R&D activity, as proxied by intangible assets, between programs.

The last two columns of Table 3 show variation in the amounts of private VC and non-VC equity raised before selection into one of the programs. Independent from the financing type (VC and non-VC), FI programs select firms with substantially higher levels of raised equity from private sources compared to those selected by DE programs. Finally, my results reveal that financial intermediaries with private market actors (GSeed and private VC) select slightly different firms in contrast to a pure government-owned fund, GVC. In particular, GVC selects larger firms with the most expenditures— among them into human capital—,

with more revenues already generated, and with the most private non-VC equity raised.

Insert Table 3 here.

5 Within-firm change in financial performance

5.1 Event study

I compare the change in the financial performance of a firm after receiving DE or FI funding in an event study. This approach allows me to assess the evolution of relative outcomes while controlling for fixed differences between selected firms that have been created at firm formation (Choi, Goldschlag, Haltiwanger, and Kim, 2021). It is unlikely that government-employed individuals of DE programs or even asset managers of FI programs can ex-ante comprehend and/or forecast changes in firm performance accurately due to the inherent uncertainty of entrepreneurial firms (e.g., Kerr, Nanda, and Rhodes-Kropf, 2014).

I estimate the following within-firm event study model:

$$\begin{aligned} Y_{itjs} = \alpha &+ \sum_{j=Grant}^{j=GSeed} \beta_{1j} Funding_j + \sum_{s=-8}^{s=8} \beta_{2s} Period_s \\ &+ \sum_{j=Grant}^{j=GSeed} \sum_{s=-8}^{s=8} \beta_{3js} Funding_j \times Period_s \\ &+ \sum_{s=-8}^{s=8} \beta_{4s} Private\ VC \times Period_s + \delta_i + \gamma_{it} + \varepsilon_{itjs} \end{aligned} \tag{2}$$

The dependent variable Y_{ijt} is the cumulative change in the financial performance of firm i from its inception up to the year t, which is s years before or after receiving public funding through the program j, winsorized at the 1^{st} and 99^{th} percentiles. $Funding_j$ are four

dummy variables receiving a value of one if the firm receives public funding through DE or FI programs. The program category $Grant_{only}$ is omitted. $Period_s$ is a categorical variable representing the pre- and post-funding period, which takes values from 8 to 8. The period category $s = -1$ (the year prior to receiving funding) is omitted. This variable absorbs the "additional-cash effect" independent from the source. $Funding_j \times Period_s$ are interaction dummy variables with a value of one for each post-program j-period. In addition, $Private\ VC \times Period_s$ controls for the changes in financial performance driven by the private VC investment in firm i. δ_i is the firm fixed effect, while $\gamma_{i,t}$ is the calendar year by firm age fixed effect. The program-firm-year level of analyses allows for multiple funding events at different points of time to be accounted for; one firm is included several times if it receives several public funding amounts from either the same or different funding sources. Standard errors are clustered at the firm level. In addition to the detailed event study analyses presented in Figures 8, I also estimate a difference-in-differences model as the average effect across all post-funding years in Table 4a. These are estimated using the same Equation 2, except the event study indicators are replaced with a single variable: $Post$, denoting the time period after receiving public funding. This indicator turns on starting in the year of receiving public funding $s = 0$. Table 4b is a compromise between the detailed event study model and the summarized difference-in-differences model, which disaggregates the post-funding period into short- (up to two years), medium- (three to five years), and long-term (more than five years) horizons.

Insert Figures 8 here.

My analyses show that ROA decreases in all firms after receiving public funding from any program, as can be seen in Table 4a. The negative effect varies among programs even within the same route. F-tests reject the null hypotheses on the equality of coefficients.

On average, the decrease in ROA is economically and statistically significantly larger after FI funding (GVC: 9.695***, GSeed: 5.981***) than after DE funding (Grant: 3.490***. Loan: 1.550***). A closer look at the disaggregated post-funding period coefficients in Table 4b reveals that the difference between programs arises in the short- and long-term— I cannot reject the equality hypothesis within each route at the 10% significance level in the medium term. Figure 8 additionally shows that after five years, the strong negative effect persists after Grant and GSeed, whereas it is relatively stable after the Loan and reverts to a positive trend after GVC. Thus, this evidence suggests that a generalized statement about the superiority of one route over another is not possible.

Among all types of financial intermediaries, firms experience a smaller decrease in ROA after receiving equity from private VCs than after receiving equity from government-involved VCs, but the difference is not statistically significant in the medium term. In fact, there is also an upward trend five years after private VC equity is received, though not to the same extent as after GVC, as can be seen in Figure 8. This evidence indicates that the effect of funding provided by government-supported VCs, which combine both public and private elements, differs from that of funding provided by VCs with a single motivation.

The general decrease in ROA does not necessarily result from the post-funding increase in firm size (measured as total assets). In fact, only firms after receiving the Loan grow by an additional 155-173 percentage points in the first five years before reverting to their pre-funding size, as can be seen in Table 4b. The change in post-funding firm size attributable to receiving money from other public funding programs is not statistically significantly different from the change in the pre-funding period. This implies— and Figure 8 confirms— that the decrease in ROA is driven by the decrease in earnings, EBIT. The decrease in EBIT after receiving additional outside financing can result either from the decrease in revenues if firms no longer want/have to rely on internal financing or from an increase in expenditures, thus

meaning higher investment activity.

Insert Table 4a-4b here.

The evidence in Table 4a does not support the possible explanation that firms generate lower revenues after receiving public funding. All programs have a non-negative effect on the change in revenues. However, Figure 8 reveals that firms exhibit an upward trend throughout the post-funding period after receiving FI funding, whereas the positive effect reverts five years after receiving DE funding. Magnitude-wise, firms increase revenues in the first five years after receiving GSeed to a similar extent as for both DE programs, while firms after GVC funding experience the largest and statistically significant persistent (cumulative) increase in revenues of 900-1,800 percentage points, as can be seen in Table 4b. This implies that the GVC program in particular is the most suitable public funding program to bring about commercialization success if it is the objective of governmental intervention into the private financing market. Figure 8 shows that, among all financial intermediaries, GVC has the largest and persistently increasing effect on post-funding revenues, which is approximately three times as large as that of private VC financing (350-685 percentage points). GSeed, in contrast, has the lowest and weakest positive effect on revenues, which is statistically significant at the 10% significance level only in the short term (158 percentage points) and long term (230 percentage points).

Another explanation for the decreasing effect on earnings is the increase in investment activity. Thus, the question of whether firms increase investments on the dimensions that align with potential governmental objectives to create more employment or foster R&D activity arises. I observe a positive effect on investment in human capital only in DE firms. There is a short-term increase after receiving the Loan (coefficient 1.826*) and an average increase of 500 percentage points after the Grant. While the personnel expenses continuously

increase for the latter program in the first five years, the positive trend reverts in the long term, as can be seen in Figure 8. Regarding FI programs, my analyses show no changes in cumulative personnel expenses after receiving GVC. In contrast, GSeed persistently invests less in human capital in the medium and long term than in the pre-funding period (coefficients 3.702** and 4.511**, respectively), whereas firms increase their investment in human capital by an average of 185 percentage points after receiving private VC equity, though this positive effect is only statistically significant in the medium term.

Table 4a and Figure 8 show that firms after receiving DE funding also exhibit an increase in intangible assets, indicating an increase in R&D activity, albeit with a reverting trend over the post-funding period. However, the magnitude and period of the increase differ between the Grant and Loan. While firms increase their intangible assets by 135 percentage points in the first two years after receiving Grant funding, firms after Loan funding have a positive (decreasing) effect of 367 to 187 percentage points throughout the post-funding period, as can be seen in Table 4b. GVC is similar to the Loan in the first five years— the coefficients from F-tests to test the equality of coefficients are not statistically significant. However, I do not observe a positive and statistically significant effect of GVC in the long term, implying that the Loan is the most suitable public funding program to increase capitalized R&D activity in a firm. In addition, on this dimension, GSeed has a persistently increasing negative effect of 154 to 312 percentage points on the change in intangible assets. This effect also differs from that of private VC, which results in a decrease of 192 percentage points only in the long term. This implies that, among financial intermediaries, only the GVC program has a positive effect on my proxy for R&D activity, albeit only in the first five years after receiving it.

Public funding and follow-on private financing

In addition to firm financial performance, which is the main focus of the paper, the last two columns of Tables 4a-4b analyze whether public funding provided through one of the programs is able to unlock additional equity from the private capital market. This is claimed to be one of the governmental objectives for establishing public funding policies in Norway (Section 2) and worldwide (Bai, Bernstein, Dev, and Lerner, 2021). Thus, I evaluate whether receiving financing through one of the public funding programs sends a positive or negative signal to the private investors. Table 4a reveals that all programs lead to an increase in private VC and non-VC capital, albeit to different extents. FI programs attract more private VC investments than DE programs, which might be the result of syndication (e.g., Hochberg, Ljungqvist, and Lu, 2007) between all types of VC investors. At the same time, received FI financing also sends on average a stronger positive signal to non-VC investors, but the signal from GSeed is similar magnitude-wise to the one by the Grant. All patterns are persistent throughout the post-funding period, as can be seen from Table 4b.

Among financial intermediaries, private VCs send by far the strongest signal to their peers— private VC investments increase on average by 235 percentage points, while government-owned GVC and government-supported GSeed lead to an increase of "only" 137 and 113 percentage points, respectively. On the one hand, this might be the result of continuation decisions made by VCs (e.g., Ewens, Rhodes-Kropf, and Strebulaev, 2016). On the other hand, if the increase in VC investments is a result of syndication, this evidence implies that private VCs mostly prefer to co-invest with other privately-held peers, and only to a lesser extent with GVC or GSeed. Given that GVC provides the largest funding amounts, there might not be the need for syndication, but given that GSeed provides similar amounts and is similar to private VCs in firm selection, I interpret my findings as that private VCs discount firms in future financing decisions for receiving GSeed funding. In contrast, non-

VC investors do not discriminate against it— the increase in non-VC equity after GSeed is economically and statistically significantly similar to the increase in non-VC equity of around 500 percentage points after private VCs. At the same time, GVC sends the strongest positive signal to non-VC investors as the non-VC equity persistently increases by 664-1010 percentage points in the post-funding period.

5.2 Instrumental variable estimation

The event study in the previous sector analyzes the differences in the change of financial performance between the pre- and post-funding periods. The goal of this section is to evaluate the effect of public funding per NOK from each program; in other words, to determine whether the size of the funding amount matters. I instrument the received public funding amount by firm i at time point t through program j with each program's j remaining budget before allocating a funding amount to firm i. My instruments are correlated with the endogenous public funding amounts. If more budget is left, the probability is higher that the firm i will be selected into the program, and if so, it can receive a larger funding amount. The remaining budget of a program j consists of two components: aggregate governmental capital supply and funding amounts already allocated to other firms. The exclusion restriction holds if these components are exogenous from the micro-level financial performance of firm i. On the one hand, the decision to select a firm into a program is independent from the financial performance of all other firms that might consider applying for this program. On the other hand, the aggregate capital supply is governed by the politics, as described in Section 2. The Ministry of Trade and Industry's budget proposals do not indicate that there is a connection between separate programs' supply decisions or that these are a response to growing investment opportunities and capital demand.[11] I verify this by

[11]These documents are publicly available at www.regjeringen.no.

calculating Pearson correlations between aggregated capital supply into programs and several indicators of the overall economic conditions as proxies for growing investment opportunities and growing capital demand. Table 5 shows no evidence of either a significant or strong correlation between program inflows, even among the annual Grant and Loan budgets.[12] However, the Grant is highly related to current and lagged total governmental expenditures (a strong significant correlation of 88%) and negatively correlates with the oil export. Being an oil-dependent country, the Norwegian government compensates for the declining economic conditions (=less oil exports) by spending more in total and providing more capital through the Grant program. In contrast, the GVC inflow seems to be purely supply-side driven; it significantly correlates with the oil price and, thus, governmental oil-generated revenues.

Insert Table 5 here.

I run an OLS regression without instrumental variables, an OLS regression with instruments, and 2SLS regressions of the following linear model:

$$Y_{itj} = \alpha + \sum_{j=Grant}^{j=GSeed} \beta_{1j} Funding_{IV,itj} + \beta_2 Private\ Capital_{it} + \delta_i + \gamma_{it} + \varepsilon_{itj} \tag{3}$$

As in the previous section, the dependent variable Y_{ijt} is the cumulative change in the financial performance of firm i from its inception up to the year t, winsorized at the 1^{st} and 99^{th} percentiles. In contrast to the previous sections, the analyses are on the firm-year level. $Funding_{IV,itj}$ are four continuous variables of the cumulative (instrumented) public funding amounts received by firm i up to the year t from each program j. The omitted program category is $Grant_{only}$. To separate the effect of public funding from private financing, I add $Private\ Capital_{it}$, which controls for the received cumulative private financing (VC equity,

[12] Granted, these correlations are based on a limited number of years, so the descriptive evidence in Table 5 is suggestive in nature.

non-VC equity, bank loan) amount up to the year t. δ_i is the firm fixed effect, and $\gamma_{i,t}$ is the calendar year by firm age fixed effect. Standard errors are clustered at the firm level.

Table 6a-6b compares estimates from the OLS regression with non-instrumented public funding amounts with OLS estimates from the regression with instrumented public funding amounts, as well as with estimates from a 2SLS regression. The coefficients are consistent between three estimation methods. After controlling for the amount of (already) received private financing, Table 6a shows that only an increase in GVC amount reduces the cumulative change in ROA (by 78 percentage points) within a firm. The funding size for other governmental programs does not seem to have an effect on the aggregate profitability ratio. The IV estimation confirms that the decreasing effect on ROA is driven by the decrease in EBIT.

Once I disaggregate earnings into the components in Table 6b, I observe substantial difference in the revenues, even when funding is received within the same route. A 1% increase in the Grant amount results in a 6.3 percentage point decrease in cumulative revenues, while the same increase in the Loan amount results in a 9.3 percentage point increase in cumulative revenues. These economically moderate changes in revenues are statistically significant at the 10% significance level and advocate for the provision of small public grants but large public loans. In contrast, I observe a stronger effect after an increase in FI funding. While a 1% increase in GVC amount leads to a 83.3 percentage point increase in cumulative revenues, an increase in GSeed amount has an opposite effect on cumulative revenues, albeit to a smaller magnitude and statistically significant only at the 10% significance level (coefficient 0.223*). Again, this speaks in favor of providing large GVC but small GSeed investments.

Regarding changes in investment activity, Table 6b shows that the public funding amounts provided through both DE programs have a similar effect on the change in personnel

expenses; a 1% increase in the provided Grant or Loan amount leads to a 14-15 percentage point increase in investment in human capital. In addition, Table 6b provides evidence that the increase in this investment activity is three times larger (coefficient 0.498**) with increasing GVC than DE amounts. At the same time, estimations in this section confirm the decrease in investments in human capital after receiving GSeed financing, even if the negative coefficient is not statistically significant here.

The findings on the effect of funding amounts on R&D activity, proxied by intangible assets, align with findings from the event study model: (i) larger Grant, Loan, and GVC amounts result in an increase in intangible assets by 13, 28, and 32 percentage points, respectively; (ii) the magnitude of the effect by the Loan amount is similar to the one by GVC; and (iii) an increase in the GSeed funding amount reduces intangible assets by 18 percentage points.

Insert Tables 6a-6b here.

5.3 Discussion of results

DE programs are "pure" funding programs that lack any governance element by governmental employees who allocate funds to the firms. This implies that the funding effect is driven by the entrepreneur's incentive to utilize money in a certain way, which depends on the financial instrument they have been provided. A grant is "cheap" money with no obligation of re-payment; thus, the entrepreneur can spend this money without any growth or improvement intention. Indeed, my analyses show that firms do not improve their revenues; rather, they increase their expenditures — they invest in human capital and R&D activity. This firm behavior aligns with the governmental objective to increase employment — provided that the increased personnel expenses are the result of new hires and not increased salary — and R&D activity. Public loans differ from public grants in that

the loan amount needs to be re-payed; thus, the entrepreneur has the incentive to improve firm performance in order to be able to do so. I provide evidence that a change in the financial instrument under the same conditions (allocation by a government employee, no governance element) results in greater firm growth, as there is an increase in total assets, in intangible assets (to a higher extent than after a grant), and in revenues.

FI programs (and private VC investments) differ from DE programs in that they provide equity to entrepreneurial firms. In this case, the entrepreneur has strong incentives to improve performance in order to retain control rights in the firm (Kaplan and Strömberg, 2003) and secure following financing rounds (Gompers, 1995). From the investor's perspective, the incentives to impose milestones, execute monitoring, or provide value-adding services to their investees will depend on their requirement to generate financial returns. GVC, the government-owned fund, does not have an immediate requirement to generate a positive financial return; thus, I consider it as the closest to DE programs. The evidence suggests that firms behave similarly after receiving GVC equity or public loans. The main difference lies in the magnitude of the growth of revenues; revenues after the former grow six times as much as after the latter. There are three possible explanations. The first is the change in the entrepreneur's incentive, resulting from the change in the financial instrument (switch from debt to equity). Second, the difference may result from the additional governance element inherent to a VC investment. Third, a requirement to achieve certain milestones may push the entrepreneur to generate more revenues.

If the change in the financial instrument is the main driver, I should observe the same effect on revenues after all equity investments. If staged financing and the requirement of milestones drive the result, I should see the larger effect after government-supported VC and private VC as they have to generate positive financial returns on their investments. However, neither GSeed nor private VC achieve the same level of increase in revenues. In addition,

firms invest more in R&D after GVC than after private VC. This implies that simple public equity provision, as opposed to public grants or public debts, is not sufficient to increase the positive effect on firms' commercialization success or R&D activity. These findings highlight the importance of highly skilled professional investors involved in the governance of entrepreneurial firms as a key element of effective public funding policies if their objective is to increase the commercialization success and/or R&D activity of firms.

Lastly, my analyses demonstrate that government-supported VC funds with the dual representation of both public and private interests have an adverse effect on firms compared to the portfolio companies of VC funds with a single representation of either private or public interest. These firms have the lowest increases in revenues and invest less in human capital and R&D activity after receiving GSeed funding. Thus, the questions of how they utilize received funding and why government-supported VC funds do not monitor firms to determine their behavior aligns with any governmental objective arise. A possible explanation is a potential discrepancy between public and private target functions or any other political frictions that preserve these VC funds to operate similarly to VC funds that represent only one — either private or public — interest.

6 Conclusion

This paper empirically compares the financial performance of entrepreneurial firms after receiving public funding provided directly to entrepreneurs or through financial intermediaries. The micro-level approach helps in understanding the way recipient firms utilize public money and whether it aligns with governmental objectives to establish a funding program. The evidence in this paper shows that a generalized statement about the superiority of one public funding route over another is not possible. There is need for a more nuanced

view on separate programs that considers incentives imposed on the entrepreneur by the financial instrument itself, the existence of the governance element in the program design, and the specific governmental objective to establish this public funding program.

This paper demonstrates that VC funds with the dual representation of interests have an adverse effect on their portfolio companies compared to the portfolio companies of VC funds with a single representation of either private or public interest. At the same time, firms backed by GVC generate more revenues and increased R&D activity compared to firms backed by private VCs. This represents an argument in favor of implementing a (pure) public investor program rather than the government acting as an LP on regular terms in private VC funds.

My conclusions about the effectiveness of public funding are based solely on the monetary effect on recipient entrepreneurial firms. A government's administrative costs for establishing and managing programs are neglected here. I also do not consider spillover effects between firms that might benefit an overall economy, and I do not estimate the effect on the private capital market participants as it is not a governmental objective carried out through all funding programs. While entrepreneurial firms are the central focus of this paper, I believe that the micro-economic comparison of public funding mechanisms is relevant in terms of broader aspects, such as during a financial or economic crisis when governmental intervention is considered.

References

Alperovych, Yan, Georges Hübner, and Fabrice Lobet, 2015, How does Governmental versus Private Venture Capital Backing Affect a Firm's Efficiency? Evidence from Belgium, *Journal of Business Venturing* 30, 508 – 525.

Amit, Raphael, James Brander, and Christoph Zott, 1998, Why do Venture Capital Firms Exist? Theory and Canadian Evidence, *Journal of Business Venturing* 13, 441 – 466.

Armstrong, Chris, Antonio Davila, and George Foster, 2006, Venture-backed Private Equity Valuation and Financial Statement Information, *Review of Accounting Studies* 11, 119–154.

Azoulay, Pierre, Joshua S. Graff Zivin, Danielle Li, and Bhaven N. Sampat, 2018, Public R&D Investments and Private-sector Patenting: Evidence from NIH Funding Rules, *The Review of Economic Studies* 86, 117–152.

Babina, Tania, Alex Xi He, Sabrina T. Howell, Elisabeth Perlman, and Joseph Staudt, 2020, The Color of Money: Federal vs. Industry Funding of University Research, Unpublished working paper.

Bai, Jessica, Shai Bernstein, Abishek Dev, and Josh Lerner, 2021, Public Entrepreneurial Finance around the Globe, Unpublished working paper.

Bernstein, Shai, Xavier Giroud, and Richard R. Townsend, 2016, The Impact of Venture Capital Monitoring, *The Journal of Finance* 71, 1591–1622.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004, How Much Should We Trust Differences-In-Differences Estimates?, *The Quarterly Journal of Economics* 119, 249–275.

Brander, James, Qianqian Du, and Thomas Hellmann, 2015, The Effects of Government-Sponsored Venture Capital: International Evidence, *Review of Finance* 19, 571–618.

Chemmanur, Thomas J., Karthik Krishnan, and Debarshi K. Nandy, 2011, How does Venture Capital Financing Improve Efficiency in Private Firms? A Look Beneath the Surface, *Review of Financial Studies* 24, 4037–4090.

Choi, Joonkyu, Nathan Goldschlag, John C. Haltiwanger, and Daniel Kim, 2021, Founding Teams and Startup Performance, NBER working paper No. 28417.

Denes, Matthew, Sabrina T. Howell, Filippo Mezzanotti, Xinxin Wang, and Ting Xu, 2020, Investor Tax Credits and Entrepreneurship: Evidence from U.S. States, Unpublished working paper.

Egger, Peter, and Christian Keuschnigg, 2015, Innovation, Trade, and Finance, *American Economic Journal: Microeconomics* 7, 121–157.

Ewens, Michael, Matthew Rhodes-Kropf, and Ilya A. Strebulaev, 2016, Inside Rounds and Venture Capital Returns, Working paper.

Färnstrand Damsgaard, Erika, Per Hjertstrand, Pehr-Johan Norbäck, Lars Persson, and Helder Vasconcelos, 2017, Why Entrepreneurs Choose Risky R&D Projects But Still Not Risky Enough, *The Economic Journal* 127, F164–F199.

Gans, Joshua S., and Scott Stern, 2003, The Product Market and the Market for Ideas: Commercialization Strategies for Technology Entrepreneurs, *Research Policy* 32, 333–350.

Gompers, Paul A., 1995, Optimal Investment, Monitoring, and the Staging of Venture Capital, *The Journal of Finance* 50, 1461–1489.

Hand, John R. M., 2005, The Value Relevance of Financial Statements in the Venture Capital Market, *The Accounting Review* 80, 613–648.

Hellmann, Thomas, and Veikko Thiele, 2019, Fostering Entrepreneurship: Promoting Founding or Funding?, *Management Science* 65, 2502–2521.

Hochberg, Yael V., Alexander Ljungqvist, and Yang Lu, 2007, Whom You Know Matters: Venture Capital Networks and Investment Performance, *The Journal of Finance* 62, 251–301.

Howell, Sabrina T., 2017, Financing Innovation: Evidence from R&D Grants, *American Economic Review* 107, 1136–64.

Hvide, Hans K., and Benjamin F. Jones, 2018, University Innovation and the Professor's Privilege, *American Economic Review* 108, 1860–98.

Jones, Charles I., and John C. Williams, 1998, Measuring the Social Return to R&D, *The Quarterly Journal of Economics* 113, 1119–1135.

Kaplan, Steven N., and Per Strömberg, 2003, Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts, *The Review of Economic Studies* 70, 281–315.

Kerr, William R., Ramana Nanda, and Matthew Rhodes-Kropf, 2014, Entrepreneurship as Experimentation, *Journal of Economic Perspectives* 28, 25–48.

Kisseleva, Katja, Aksel Mjøs, and David T. Robinson, 2020, The Returns to Early-Stage Investment in Innovation, Working paper.

Lee, Yong Suk, 2018, Government Guaranteed Small Business Loans and Regional Growth, *Journal of Business Venturing* 33, 70 – 83.

Leleux, Benoît, and Bernard Surlemont, 2003, Public versus private venture capital: Seeding or crowding out? A pan-European analysis, *Journal of Business Venturing* 18, 81–104.

Lerner, Josh, 1999, The Government as Venture Capitalist: The LongRun Impact of the SBIR Program, *The Journal of Business* 72, 285–318.

——— , 2020, Government Incentives for Entrepreneurship, NBER working paper No. 26884.

Meling, Tom Grimstvedt, 2020, Anonymous Trading in Equities, *The Journal of Finance* forthcoming.

Nilsen, Øivind A., Arvid Raknerud, and Diana-Cristina Iancu, 2020, Public R&D Support and Firm Performance: A Multivariate Dose-Response Analysis, *Research Policy* 49, 1–16.

Pless, Jacquelyn, 2020, Are 'complementary policies' substitutes? Evidence from R&D subsidies in the UK, Unpublished working paper.

Puri, Manju, and Rebecca Zarutskie, 2012, On the Life Cycle Dynamics of Venture-Capital- and Non-Venture-Capital-Financed Firms, *The Journal of Finance* 67, 2247–2293.

Sievers, Soenke, Christopher F. Mokwa, and Georg Keienburg, 2013, The Relevance of Financial versus Non-Financial Information for the Valuation of Venture Capital-Backed Firms, *European Accounting Review* 22, 467–511.

Wallsten, Scott J., 2000, The Effects of Government-Industry R&D Programs on Private R&D: The Case of the Small Business Innovation Research Program, *The RAND Journal of Economics* 31, 82–100.

Figure 1: **Government spending in developed countries**

Figure 1 shows the cross-country comparison of the general government spending in Mio US-$ per capita. These are the average numbers for the years 2007-2016.

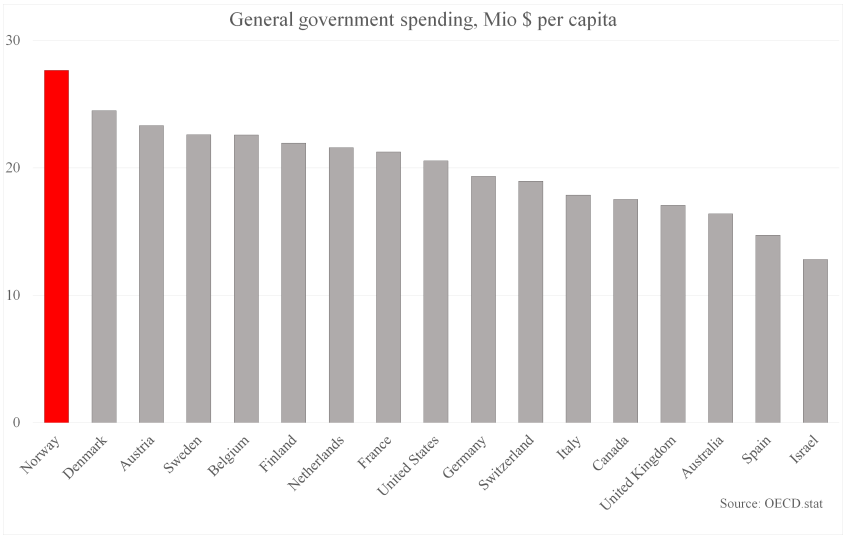


Figure 2: **VC investments in developed countries**

Figure 2 shows the cross-country comparison of total VC investments in US-$ per capita. These are the average numbers for the years 2007-2016.

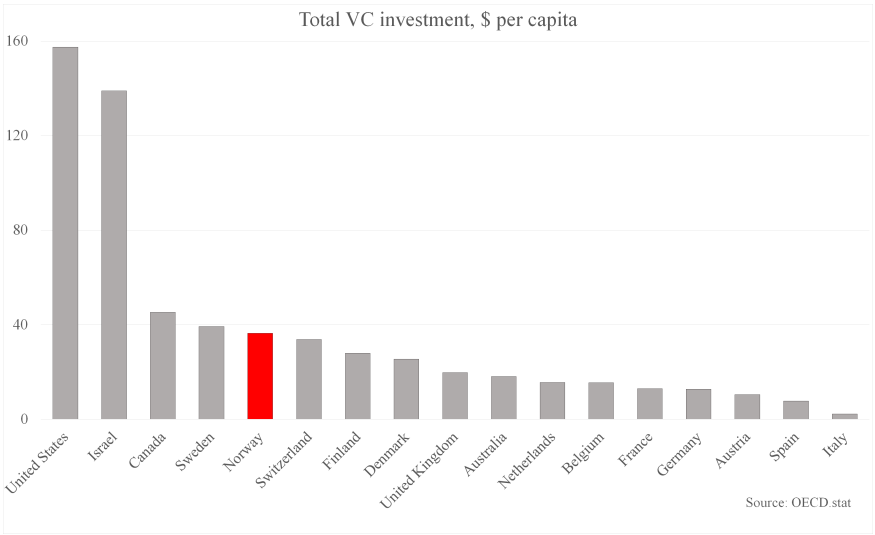


Figure 3: **Aggregate governmental capital supply and allocation**

Figure 3 shows aggregate governmental capital supply into four major public funding programs Grant, Loan, GVC and GSeed, and their capital distribution to entrepreneurial firms over time. The amounts are scaled by the Loan's annual budget in 2003.

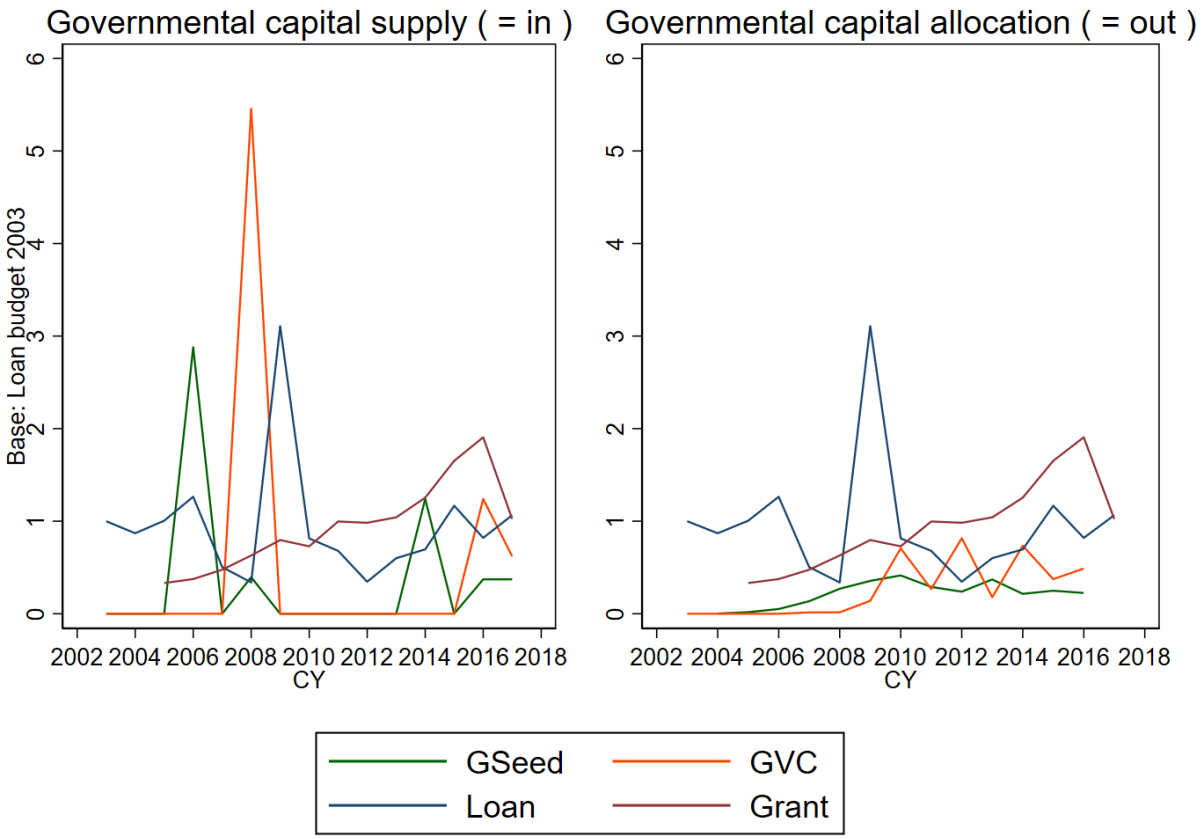


Figure 4: **Firm age when receiving public funding**

Figure 4 illustrates the firm age distribution at the time of receiving public funding (and private VC investment).

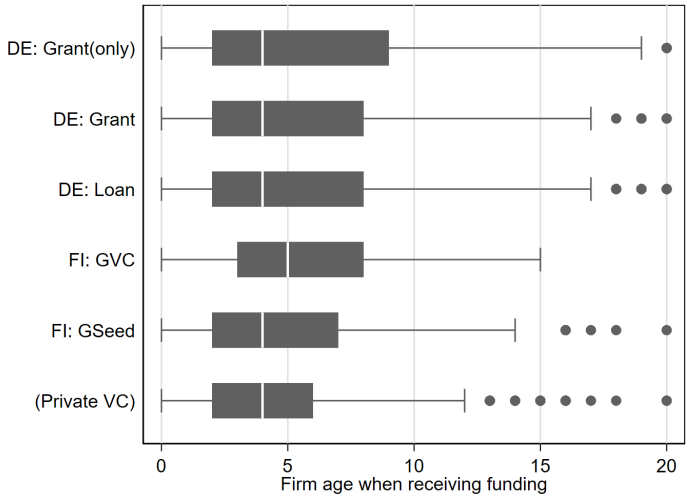


Figure 5: **Public funding amounts**

Figure 5 illustrates the funding amount distribution by the source of public funding (and private VC investment).

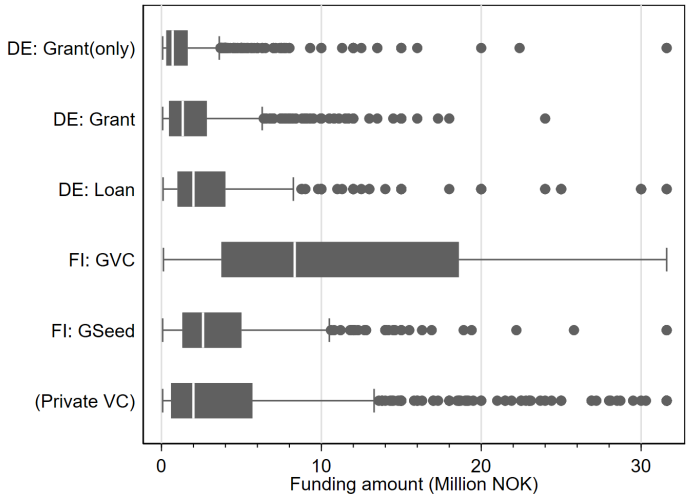


Figure 6: **Combination of public funding sources in a firm**

Figure 6 shows the occurrence of different combinations of public (and private VC) funding sources in a firm.

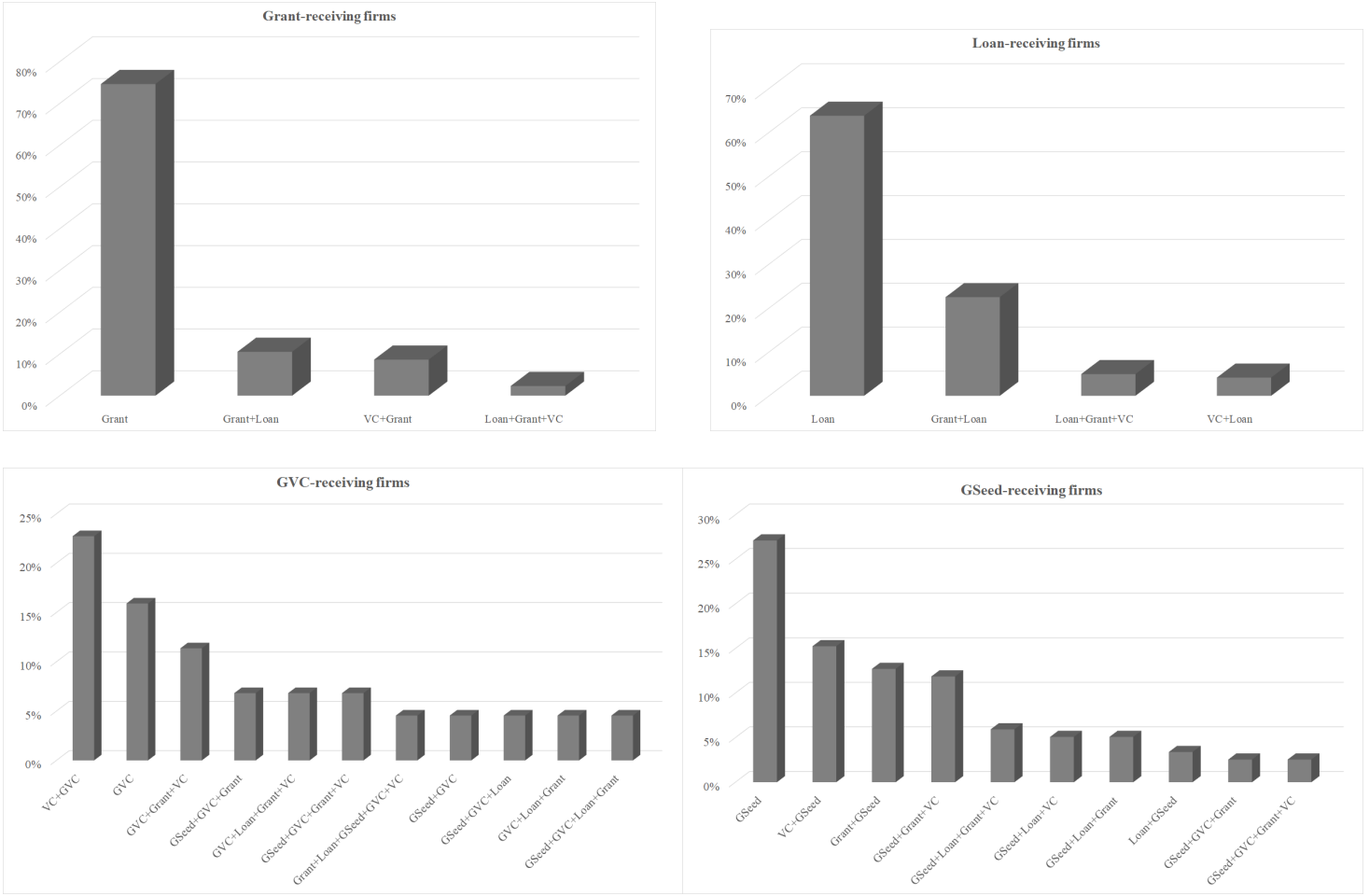


Figure 7: **Sequence of funding sources in a firm**

Figure 7 illustrates the sequence of occurrences of public funding sources and private VC in a firm.

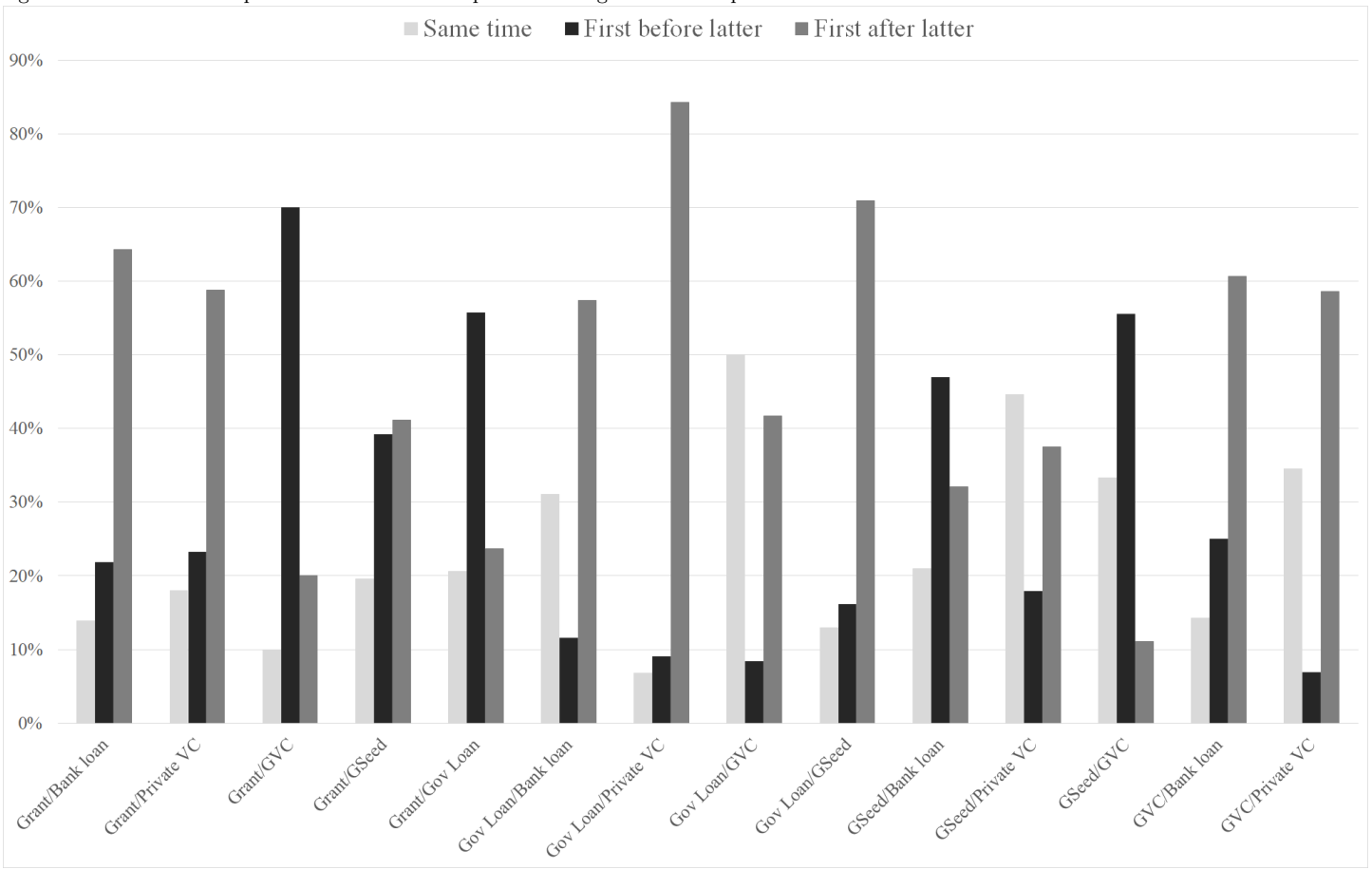
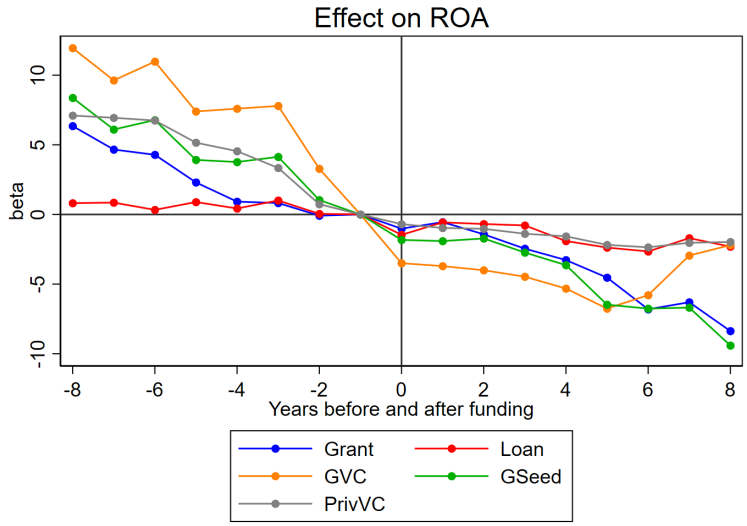
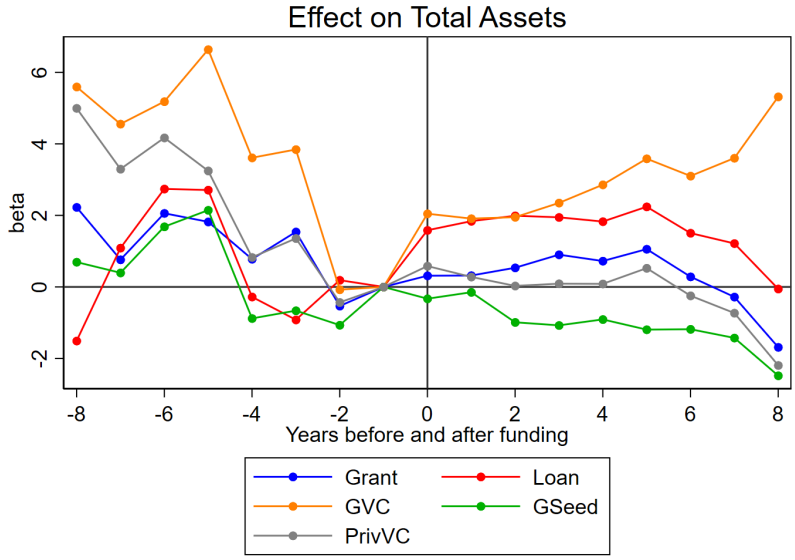
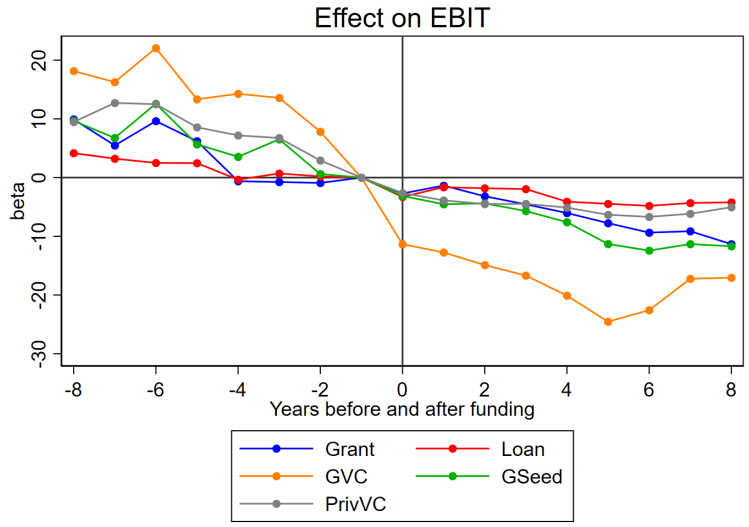


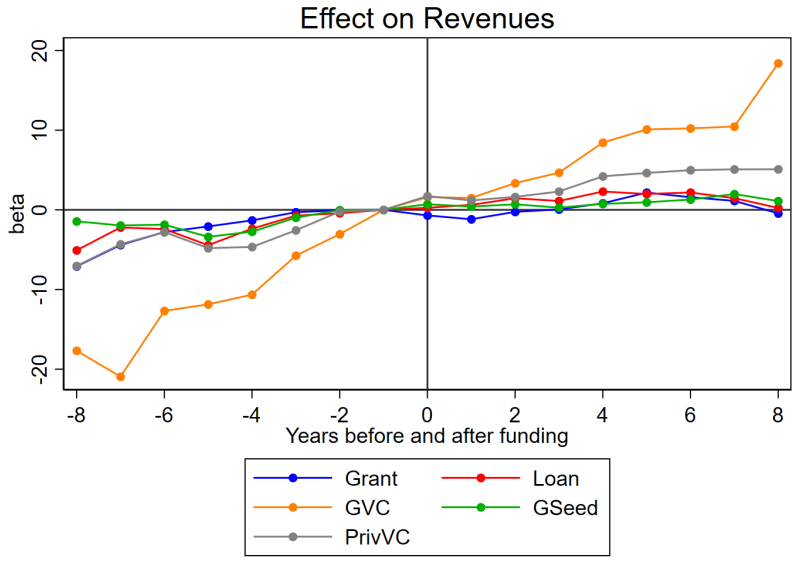
Figure 8: **Change in financial performance: Event study model**

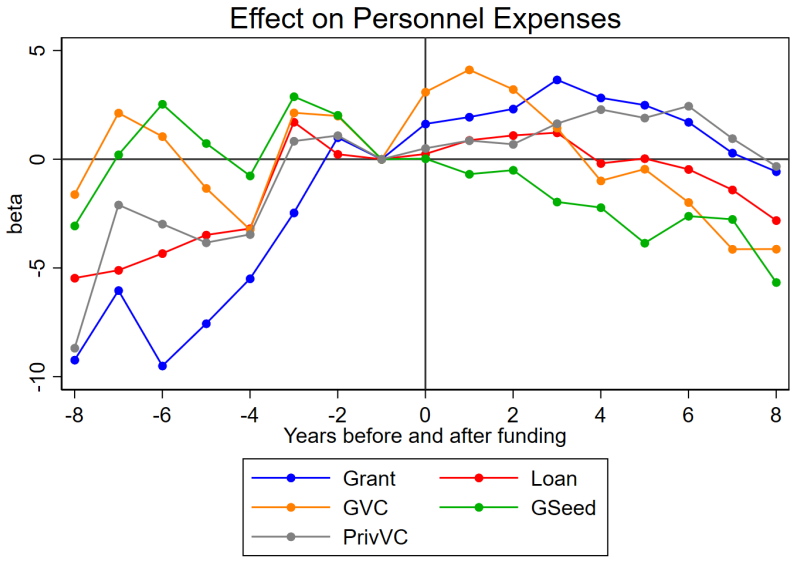
Figures 8 show coefficients on the interaction dummy variables $Funding_j \times Period_s$ in the event study model in Equation 2. Table 4 complements this graphical presentation. The omitted program category is $Grant_{only}$. The omitted period category is $s = -1$, the year prior to receiving funding. The program-firm-year level of analyses allows to account for multiple funding events at different points of time; one firm is included several times if it receives several public funding amount either from the same or different funding sources. Standard errors are clustered at the firm level.






Effect on EBIT
beta
20
10
0
-10
-20
-30
-8
-6
-4
-2
0
2
4
6
8
Years before and after funding
Grant
Loan
GVC
GSeed
PrivVC


Effect on Revenues
beta
20
10
0
-10
-20
-8
-6
-4
-2
0
2
4
6
8
Years before and after funding
Grant
Loan
GVC
GSeed
PrivVC


Effect on Personnel Expenses
beta
5
0
-5
-10
-8
-6
-4
-2
0
2
4
6
8
Years before and after funding
Grant
Loan
GVC
GSeed
PrivVC

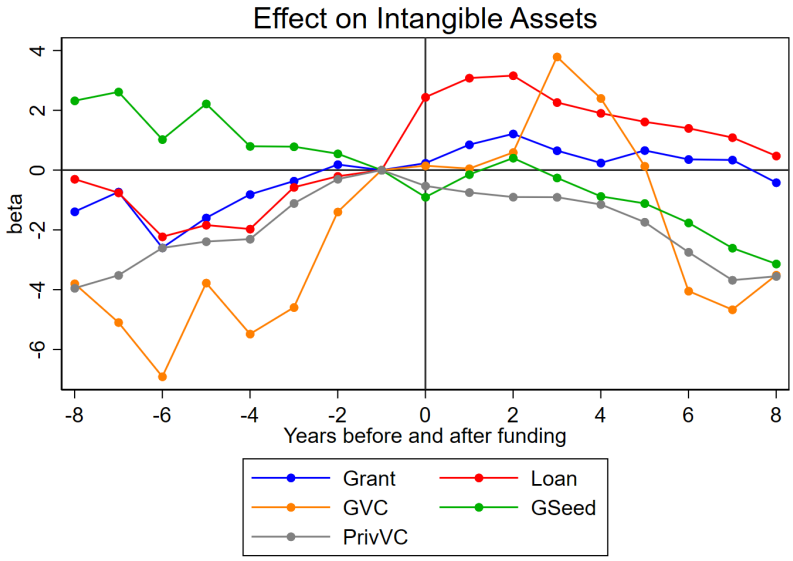

Effect on Intangible Assets
beta
4
2
0
-2
-4
-6
-8
-6
-4
-2
0
2
4
6
8
Years before and after funding
Grant
Loan
GVC
GSeed
PrivVC

Table 1: Financial incentives of governmental funding programs

Table 1 presents an overview of financial incentives of different market actors (government, distributor (fund manager vs. governmental employee), entrepreneur) participating in the four major public funding programs.

FI programs	GSeed	GVC
Government	Modified financial return	Intended long-term value
Distributor (Fund manager)	Carry and future fundraising	Carry
Entrepreneur	Equity stake	Equity stake
DE programs	Loan	Grant
Government	Fixed amount	None, grant
Distributor (Innovation Norway employee)	None, annual budget	None, annual budget
Entrepreneur	Fixed amount	None, cheap money

Table 2: Financial performance before funding: descriptive statistics

Table 2 characterizes firms one year before receiving public (or private VC) funding. The program-firm-year level of analyses allows to account for multiple funding events at different points of time; one firm is included several times if it receives several public funding amount either from the same or different funding sources.

		%	Tsd NOK						
		ROA	Total assets	EBIT	Revenues	Personnel expenses	Intangible assets	Raised VC equity	Raised non-VC equity
Grant (only)	*mean*	-20.6%	101.30	1.38	55.09	18.66	3.18	0	3,983
	median	-0.2%	3.15	0.00	1.70	1.08	0.02	0	120
Grant	*mean*	-38.7%	24.79	-2.40	15.14	6.17	5.34	4,011	13,577
	median	-13.0%	6.46	-0.42	1.56	1.63	0.50	0	1,330
Loan	*mean*	-23.7%	42.73	-1.71	27.99	7.81	5.13	1,884	11,550
	median	-1.9%	6.56	-0.04	2.65	1.50	0.28	0	609
GVC	*mean*	-54.3%	61.10	-15.38	24.24	13.71	16.06	27,255	45,146
	median	-39.1%	30.47	-8.79	3.79	6.64	2.46	3,499	27,701
GSeed	*mean*	-62.0%	18.08	-5.31	8.34	4.94	5.50	3,737	11,190
	median	-45.0%	7.93	-3.02	1.02	2.13	0.95	0	3,575
Private VC	*mean*	-57.6%	31.23	-6.71	9.16	5.78	8.01	-	19,454
	median	-38.6%	7.40	-2.33	0.58	1.73	1.28	-	3,611

Table 3: Observable financial performance before public funding

Table 3 presents OLS estimates of the cross-sectional linear model as specified in Equation 1. The dependent variables are the firms' observable financial performance one year before receiving public funding and are winsorized at the 1^{st} and 99^{th} percentiles (before taking the natural logarithm +1). The program-firm-year level of analyses allows to account for multiple funding events at different points of time; one firm is included several times if it receives several public funding amount either from the same or different funding sources. Standard errors are clustered at the firm level.

	%	LN (X+1)						
	ROA	Total assets	EBIT	Revenues	Personnel expenses	Intangible assets	Raised VC equity	Raised non-VC equity
Constant	-0.133	5.588***	4.019	1.959**	0.978	1.096	-3.986***	9.433***
	[0.104]	[0.380]	[2.428]	[0.665]	[0.531]	[0.672]	[0.841]	[1.003]
Grant	-0.158***	0.478***	-2.877***	-0.574**	0.295	1.312***	4.360***	2.204***
	[0.045]	[0.108]	[0.536]	[0.203]	[0.163]	[0.220]	[0.363]	[0.300]
Loan	-0.038	0.505***	-2.247***	0.242	0.250	1.209***	1.652***	1.367***
	[0.035]	[0.102]	[0.645]	[0.169]	[0.148]	[0.184]	[0.213]	[0.289]
GVC	-0.324***	1.627***	-14.120***	0.132	1.579***	1.924**	9.628***	4.561***
	[0.083]	[0.266]	[2.008]	[0.509]	[0.299]	[0.715]	[1.114]	[0.691]
GSeed	-0.400***	0.499**	-5.298***	-0.892**	0.303	1.617***	5.416***	2.907***
	[0.057]	[0.166]	[0.775]	[0.333]	[0.282]	[0.336]	[0.712]	[0.370]
Private VC	-0.316***	0.698***	-6.794***	-0.840***	0.581***	2.109***	10.475***	3.128***
	[0.042]	[0.129]	[0.768]	[0.228]	[0.175]	[0.248]	[0.296]	[0.302]
Observations	3,819	3,921	3,921	3,921	3,921	3,921	3,921	3,921
R-squared	10.2%	32.5%	15.8%	27.5%	30.8%	16.3%	42.7%	14.9%
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Aggregate gov supply	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Test: Equality of coefficients								
Grant=Loan	0.002	0.784	0.243	0.000	0.762	0.600	0.000	0.001
GVC=GSeed	0.370	0.000	0.000	0.050	0.000	0.639	0.000	0.002
Loan=GVC	0.001	0.000	0.000	0.827	0.000	0.317	0.000	0.000
GVC=Private VC	0.916	0.000	0.000	0.043	0.000	0.791	0.419	0.027
GSeed=Private VC	0.125	0.169	0.075	0.861	0.300	0.119	0.000	0.511

Robust standard errors in parentheses

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

Table 4: Within-firm change in financial performance

Table 4 displays coefficients from the estimation of the difference-in-differences model (4a) as well as for the disaggregated post-funding period model (4b) as specified in Equation 2. The dependent variable Y_{ijt} is the cumulative change in the financial performance of firm i since its inception up to the year t, which is s years before or after receiving public funding through the program j, winsorized at the 1^{st} and 99^{th} percentiles. The omitted program category is $Grant_{only}$. The program-firm-year level of analyses allows to account for multiple funding events at different points of time; one firm is included several times if it receives several public funding amount either from the same or different funding sources. Standard errors are clustered at the firm level.

a: Difference-in-differences model

Change since inception, %	ROA	Total assets	EBIT	Revenues	Personnel expenses	Intangible assets	Raised VC equity	Raised non-VC equity
Constant	-2.913	9.647**	-6.542	8.952**	10.755*	7.677**	-0.332	-9.700**
	[3.218]	[3.000]	[6.413]	[3.302]	[5.351]	[2.908]	[0.252]	[3.677]
Grant (1/0)	-0.055	-0.606	-2.075*	2.481***	-1.233	-0.926*	0.925***	-1.239*
	[0.472]	[0.440]	[0.941]	[0.484]	[0.785]	[0.427]	[0.037]	[0.539]
Loan (1/0)	-1.169*	-1.600***	-3.055**	1.582**	0.697	-2.145***	1.292***	0.271
	[0.520]	[0.485]	[1.037]	[0.534]	[0.865]	[0.470]	[0.041]	[0.594]
GVC (1/0)	2.593**	-0.512	7.155***	-2.860***	0.511	-1.395	0.752***	-1.124
	[0.790]	[0.736]	[1.574]	[0.811]	[1.314]	[0.714]	[0.062]	[0.903]
GSeed (1/0)	1.273*	-0.186	0.187	1.936**	3.146**	0.844	0.778***	0.214
	[0.584]	[0.545]	[1.165]	[0.600]	[0.972]	[0.528]	[0.046]	[0.668]
Post (1/0)	2.189***	1.523***	2.879***	-1.405***	-0.009	0.504	-0.715***	-1.913***
	[0.351]	[0.327]	[0.700]	[0.360]	[0.584]	[0.317]	[0.028]	[0.401]
Grant*Post	-3.490***	-0.238	-5.359***	0.823	4.928***	1.042*	0.863***	6.478***
	[0.505]	[0.470]	[1.005]	[0.518]	[0.839]	[0.456]	[0.040]	[0.576]
Loan*Post	-1.550**	1.446**	-3.451***	2.327***	1.327	3.062***	0.220***	3.898***
	[0.486]	[0.453]	[0.968]	[0.498]	[0.808]	[0.439]	[0.038]	[0.555]
GVC*Post	-9.695***	-0.131	-25.935***	12.152***	1.254	4.002***	1.372***	8.329***
	[0.987]	[0.920]	[1.967]	[1.013]	[1.641]	[0.892]	[0.077]	[1.128]
GSeed*Post	-5.981***	-0.816	-9.552***	1.434*	-2.983**	-1.839***	1.125***	5.129***
	[0.618]	[0.576]	[1.232]	[0.634]	[1.028]	[0.559]	[0.049]	[0.706]
Private VC*Post	-3.627***	-1.213**	-8.663***	4.525***	1.849*	-0.399	2.353***	4.801***
	[0.499]	[0.465]	[0.995]	[0.512]	[0.830]	[0.451]	[0.039]	[0.571]
Observations	41,283	41,342	41,342	41,342	41,342	41,342	41,342	41,342
R-squared	72.0%	81.9%	80.0%	74.1%	73.8%	75.0%	85.7%	78.0%
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age*CY FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Test: Equality of coefficients								
Grant=Loan	0.000	0.001	0.083	0.008	0.000	0.000	0.000	0.000
GVC=GSeed	0.001	0.496	0.000	0.000	0.018	0.000	0.003	0.009
Loan=GVC	0.000	0.095	0.000	0.000	0.965	0.305	0.000	0.000
GVC=Private VC	0.000	0.253	0.000	0.000	0.724	0.000	0.000	0.002
GSeed=Private VC	0.000	0.519	0.500	0.000	0.000	0.016	0.000	0.663

Robust standard errors in parentheses

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

b: Disaggregated post-funding period

Change since inception, %	ROA	Total assets	EBIT	Revenues	Personnel expenses	Intangible assets	Raised VC equity	Raised non-VC equity
Constant	-2.864	9.696**	-6.554	9.093**	10.932*	7.726**	-0.298	-9.651**
	[3.216]	[2.998]	[6.412]	[3.301]	[5.350]	[2.903]	[0.251]	[3.673]
Grant (1/0)	-0.021	-0.616	-2.033*	2.504***	-1.202	-0.939*	0.928***	-1.273*
	[0.472]	[0.440]	[0.941]	[0.484]	[0.785]	[0.426]	[0.037]	[0.539]
Loan (1/0)	-1.203*	-1.600***	-3.103**	1.634**	0.750	-2.135***	1.304***	0.251
	[0.520]	[0.485]	[1.037]	[0.534]	[0.866]	[0.470]	[0.041]	[0.594]
GVC (1/0)	2.595**	-0.599	7.250***	-2.908***	0.496	-1.496*	0.740***	-1.257
	[0.790]	[0.736]	[1.574]	[0.810]	[1.314]	[0.713]	[0.062]	[0.902]
GSeed (1/0)	1.272*	-0.232	0.225	1.963**	3.144**	0.778	0.776***	0.153
	[0.584]	[0.545]	[1.165]	[0.600]	[0.972]	[0.528]	[0.046]	[0.667]
Post: Short-term (1/0)	1.795***	1.445***	2.313**	-1.095**	-0.282	0.125	-0.666***	-1.977***
	[0.374]	[0.348]	[0.745]	[0.383]	[0.621]	[0.337]	[0.029]	[0.427]
Post: Medium-term (1/0)	2.482***	-0.209	4.425***	-2.367***	-1.510	-1.327**	-1.062***	-3.947***
	[0.491]	[0.457]	[0.978]	[0.504]	[0.816]	[0.443]	[0.038]	[0.560]
Post: Long-term (1/0)	3.658***	-0.238	6.647***	-3.300***	-2.025	-1.982***	-1.342***	-5.925***
	[0.645]	[0.600]	[1.284]	[0.661]	[1.071]	[0.581]	[0.050]	[0.735]
Grant*Short-term	-2.003***	-0.165	-3.548**	0.259	4.941***	1.349*	0.763***	5.974***
	[0.583]	[0.543]	[1.162]	[0.598]	[0.970]	[0.526]	[0.046]	[0.666]
Grant*Medium-term	-4.159***	0.408	-6.775***	1.811*	6.031***	1.170	1.042***	7.456***
	[0.694]	[0.646]	[1.383]	[0.712]	[1.154]	[0.626]	[0.054]	[0.792]
Grant*Long-term	-7.669***	-0.772	-10.241***	1.711	3.597*	0.849	1.143***	7.916***
	[0.884]	[0.822]	[1.758]	[0.905]	[1.467]	[0.796]	[0.069]	[1.007]
Loan*Short-term	-1.282*	1.546**	-3.054**	2.050***	1.826*	3.669***	0.216***	3.567***
	[0.555]	[0.517]	[1.106]	[0.569]	[0.922]	[0.501]	[0.043]	[0.633]
Loan*Medium-term	-1.917**	1.735**	-4.026**	3.008***	1.471	2.731***	0.267***	4.510***
	[0.664]	[0.619]	[1.323]	[0.681]	[1.104]	[0.599]	[0.052]	[0.758]
Loan*Long-term	-2.444**	0.831	-4.944**	2.632**	-0.351	1.869*	0.307***	4.585***
	[0.816]	[0.759]	[1.623]	[0.835]	[1.354]	[0.735]	[0.064]	[0.930]
GVC*Short-term	-9.252***	-0.598	-23.192***	9.560***	2.985	3.681***	1.230***	6.637***
	[1.156]	[1.078]	[2.305]	[1.187]	[1.923]	[1.044]	[0.090]	[1.320]
GVC*Medium-term	-10.681***	0.344	-29.806***	14.809***	-0.360	5.921***	1.475***	10.101***
	[1.415]	[1.319]	[2.821]	[1.452]	[2.354]	[1.278]	[0.111]	[1.616]
GVC*Long-term	-9.391***	0.944	-29.399***	18.388***	-3.567	-0.585	1.854***	11.736***
	[2.238]	[2.086]	[4.462]	[2.297]	[3.723]	[2.020]	[0.175]	[2.556]
GSeed*Short-term	-4.470***	-0.235	-7.411***	1.576*	-1.433	-1.069	1.056***	5.518***
	[0.726]	[0.677]	[1.447]	[0.745]	[1.207]	[0.655]	[0.057]	[0.829]
GSeed*Medium-term	-6.608***	-0.779	-11.078***	1.526	-3.702**	-1.535*	1.297***	5.771***
	[0.821]	[0.765]	[1.637]	[0.843]	[1.366]	[0.741]	[0.064]	[0.938]
GSeed*Long-term	-9.621***	-1.197	-14.598***	2.296*	-4.511**	-3.122***	1.387***	5.093***
	[1.014]	[0.943]	[2.016]	[1.038]	[1.682]	[0.913]	[0.079]	[1.155]

continued	ROA	Total assets	EBIT	Revenues	Personnel expenses	Intangible assets	Raised VC equity	Raised non-VC equity
Private VC*Short-term	-3.453***	-0.714	-8.422***	3.518***	1.637	0.579	2.186***	5.727***
	[0.577]	[0.538]	[1.150]	[0.592]	[0.959]	[0.521]	[0.045]	[0.659]
Private VC*Medium-term	-4.063***	-0.749	-9.699***	5.508***	2.874**	0.088	2.659***	4.980***
	[0.667]	[0.621]	[1.329]	[0.684]	[1.109]	[0.602]	[0.052]	[0.761]
Private VC*Long-term	-4.356***	-1.771*	-10.237***	6.853***	2.112	-1.923**	2.711***	4.877***
	[0.824]	[0.766]	[1.639]	[0.844]	[1.367]	[0.742]	[0.064]	[0.939]
Observations	41,283	41,342	41,342	41,342	41,342	41,342	41,342	41,342
R-squared	72.0%	81.9%	80.0%	74.1%	73.8%	75.1%	85.8%	78.0%
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age*CY FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Test: Equality of coefficients								
Short-term								
Grant=Loan	0.003	0.064	0.004	0.007	0.011	0.224	0.000	0.001
GVC=GSeed	0.007	0.428	0.000	0.000	0.808	0.000	0.081	0.013
Loan=GVC	0.002	0.302	0.000	0.000	0.392	0.229	0.000	0.006
GVC=Private VC	0.000	0.197	0.000	0.000	0.130	0.000	0.000	0.008
GSeed=Private VC	0.000	0.514	0.520	0.000	0.019	0.038	0.000	0.857
Medium-term								
Grant=Loan	0.264	0.059	0.068	0.122	0.000	0.000	0.000	0.002
GVC=GSeed	0.922	0.324	0.001	0.000	0.037	0.000	0.133	0.443
Loan=GVC	0.000	0.957	0.000	0.000	0.447	0.990	0.000	0.001
GVC=Private VC	0.026	0.417	0.000	0.000	0.178	0.004	0.000	0.506
GSeed=Private VC	0.197	0.971	0.037	0.000	0.000	0.206	0.000	0.816
Long-term								
Grant=Loan	0.000	0.004	0.701	0.335	0.004	0.022	0.000	0.001
GVC=GSeed	0.000	0.760	0.000	0.000	0.186	0.228	0.010	0.013
Loan=GVC	0.000	0.053	0.000	0.000	0.558	0.015	0.000	0.024
GVC=Private VC	0.000	0.917	0.000	0.000	0.499	0.511	0.000	0.002
GSeed=Private VC	0.003	0.558	0.426	0.016	0.000	0.021	0.000	0.425

Robust standard errors in parentheses

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

Table 5: Aggregate governmental capital supply

Table 5 shows Pearson correlations between capital inflow into four public funding programs ((=supply) as well as with several indicators of economic conditions in Norway in my sample period.

Pearson correlations	GVC inflow	GSeed inflow	Grant annual budget	Loan annual budget
GVC inflow	1			
GSeed inflow	0.0183	1		
Grant annual budget	-0.0505	-0.2076	1	
Loan annual budget	-0.2636	0.0467	-0.0535	1
Total gov expenditure	0.0152	-0.0594	0.8792***	-0.0642
Total gov expenditure t-1	0.0007	-0.0798	0.8767***	-0.0711
Oil price	0.5561**	0.0878	0.1003	-0.403
Oil price t-1	-0.0418	-0.0446	0.499*	0.4179
Oil export	0.3543	0.2164	-0.7203***	-0.3663
Oil export t-1	0.0895	0.0875	-0.3064	0.2269

Table 6: Public funding amount and financial performance

Tables 6a and 6b present coefficients from an OLS estimation with non-instrumented public funding amounts, from an OLS estimation with instrumented public funding amounts, as well as from a 2SLS estimation as specified in Equation 3. The dependent variable Y_{ijt} is the cumulative change in the financial performance of firm i since its inception up to the year t, winsorized at the 1^{st} and 99^{th} percentiles. The analyses are on the firm-year level. The omitted program category is $Grant_{only}$. Standard errors are clustered at the firm level.

a: ROA - Total assets - EBIT

Change since inception, %	ROA			Total assets			EBIT		
	OLS	IV	2SLS	OLS	IV	2SLS	OLS	IV	2SLS
Constant	4.587	4.558	4.322	-2.492	-2.468	-2.672	10.770	10.717	10.017
	[3.664]	[3.663]	[3.666]	[4.147]	[4.148]	[4.152]	[6.836]	[6.836]	[6.844]
Ln(Grant+1)	0.011	0.010	0.014	0.075*	0.038	0.053	-0.127*	-0.079	-0.108
	[0.030]	[0.022]	[0.030]	[0.034]	[0.025]	[0.034]	[0.056]	[0.041]	[0.056]
Ln(Loan+1)	-0.020	-0.026	-0.032	0.096*	0.053	0.067	-0.156*	-0.134**	-0.168*
	[0.035]	[0.027]	[0.035]	[0.040]	[0.031]	[0.040]	[0.065]	[0.051]	[0.066]
Ln(GVC+1)	-0.712***	-0.622***	-0.779***	0.045	0.009	0.010	-2.211***	-1.821***	-2.284***
	[0.110]	[0.088]	[0.111]	[0.124]	[0.100]	[0.125]	[0.205]	[0.164]	[0.206]
Ln(GSeed+1)	-0.133	-0.061	-0.086	-0.010	-0.012	-0.016	-0.115	-0.034	-0.046
	[0.086]	[0.062]	[0.087]	[0.098]	[0.070]	[0.099]	[0.161]	[0.116]	[0.163]
Controls									
Ln(Raised VC equity+1)	-0.288***	-0.293***	-0.290***	-0.005	0.001	0.000	-0.988***	-1.001***	-0.993***
	[0.068]	[0.068]	[0.068]	[0.077]	[0.077]	[0.077]	[0.128]	[0.127]	[0.128]
Ln(Raised non-VC equity+1)	-0.620***	-0.620***	-0.621***	0.639***	0.648***	0.647***	-1.465***	-1.467***	-1.468***
	[0.052]	[0.052]	[0.052]	[0.059]	[0.059]	[0.059]	[0.096]	[0.096]	[0.097]
Ln(Outstanding bank loan+1)	0.033	0.035	0.036	0.475***	0.485***	0.485***	0.105	0.104	0.107
	[0.047]	[0.047]	[0.047]	[0.053]	[0.053]	[0.053]	[0.087]	[0.087]	[0.087]
Observations	21,076	21,076	21,076	21,145	21,145	21,145	21,145	21,145	21,145
R-squared	70.4%	70.4%	1.2%	78.6%	78.6%	1.3%	77.1%	77.1%	1.9%
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age*CY FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

b: Revenues - Personnel expenses - Intangible assets

Change since inception, %	Revenues			Personnel expenses			Intangible assets		
	OLS	IV	2SLS	OLS	IV	2SLS	OLS	IV	2SLS
Constant	3.467	3.525	3.058	5.297	5.272	5.230	-0.895	-0.873	-1.053
	[3.807]	[3.807]	[3.811]	[5.628]	[5.628]	[5.634]	[3.189]	[3.191]	[3.193]
Ln(Grant+1)	-0.049	-0.045*	-0.063*	0.148**	0.107**	0.148**	0.149***	0.092***	0.127***
	[0.031]	[0.023]	[0.031]	[0.046]	[0.033]	[0.046]	[0.026]	[0.019]	[0.026]
Ln(Loan+1)	0.114**	0.073*	0.093*	0.130*	0.112**	0.142**	0.300***	0.220***	0.281***
	[0.036]	[0.029]	[0.037]	[0.054]	[0.042]	[0.054]	[0.030]	[0.024]	[0.031]
Ln(GVC+1)	0.779***	0.659***	0.833***	0.472**	0.397**	0.498**	0.316***	0.258***	0.323***
	[0.114]	[0.091]	[0.115]	[0.169]	[0.135]	[0.170]	[0.096]	[0.077]	[0.096]
Ln(GSeed+1)	-0.229*	-0.158*	-0.223*	-0.189	-0.132	-0.186	-0.186*	-0.130*	-0.183*
	[0.090]	[0.065]	[0.091]	[0.133]	[0.095]	[0.134]	[0.075]	[0.054]	[0.076]
Controls									
Ln(Raised VC equity+1)	0.342***	0.338***	0.338***	0.133	0.132	0.130	-0.025	-0.024	-0.025
	[0.071]	[0.071]	[0.071]	[0.105]	[0.105]	[0.105]	[0.060]	[0.059]	[0.060]
Ln(Raised non-VC equity+1)	0.333***	0.335***	0.336***	0.094	0.093	0.091	0.293***	0.300***	0.297***
	[0.054]	[0.054]	[0.054]	[0.079]	[0.079]	[0.079]	[0.045]	[0.045]	[0.045]
Ln(Outstanding bank loan+1)	0.324***	0.330***	0.330***	0.242***	0.240***	0.239***	0.284***	0.292***	0.291***
	[0.048]	[0.048]	[0.048]	[0.071]	[0.071]	[0.071]	[0.040]	[0.040]	[0.040]
Observations	21,145	21,145	21,145	21,145	21,145	21,145	21,145	21,145	21,145
R-squared	72.0%	72.0%	2.8%	73.0%	73.0%	1.5%	73.2%	73.1%	0.7%
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age*CY FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

A Appendix: Governmental capital allocation

Table A1: Timeline of governmental capital supply and allocation

Table A1 presents an overview of the governmental capital (in MNOK) supply into four major public funding programs and its allocation to entrepreneurial firms in my sample period.

CY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GSeed in		1,161		159						500		150
GSeed out	7	21	55	109	143	167	117	96	149	87	100	91
GVC in				2,200								500
GVC out			6	6	56	285	108	329	72	296	151	197
Loan	406	511	204	137	1,254	329	275	140	243	281	471	331
Grant	134	152	192	254	322	294	403	397	421	506	667	769
Total in	540	1,824	396	2,750	1,576	623	678	537	664	1,287	1,138	1,750
% GSeed	0%	**64%**	0%	6%	0%	0%	0%	0%	0%	**39%**	0%	9%
% GVC	0%	0%	0%	**80%**	0%	0%	0%	0%	0%	0%	0%	**29%**
% Loan	75%	28%	52%	5%	**80%**	53%	41%	26%	37%	22%	41%	19%
% Grant	25%	8%	48%	9%	20%	47%	**59%**	**74%**	**63%**	39%	59%	**44%**
Total out	547	684	457	506	1,776	1,075	903	962	886	1,170	1,389	1,388
% GSeed	1%	3%	12%	22%	8%	16%	13%	10%	17%	7%	7%	7%
% GVC	0%	0%	1%	1%	3%	26%	12%	34%	8%	25%	11%	14%
% Loan	74%	75%	45%	27%	71%	31%	30%	15%	27%	24%	34%	24%
% Grant	24%	22%	42%	50%	18%	27%	45%	41%	48%	43%	48%	55%

Figure A1: **Governmental capital allocation by industry**

Figure A1 shows the total capital allocation through private VCs, FI programs (and its disaggregated programs) and DE programs (and its disaggregated programs) over industries.

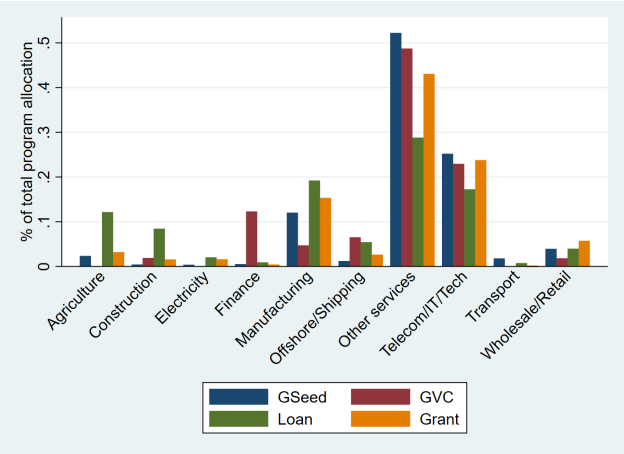


Figure A2: **Governmental capital allocation by region**

Figure A2 shows the total capital allocation through private VCs, FI programs (and its disaggregated programs) and DE programs (and its disaggregated programs) over regions.