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Ex-ante analysis of the programme "INVEST - Grant for Venture Capital"

Abstract

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1 Introduction

According to the Guidelines on State Aid for Risk Financing (Risk Finance Guidelines) of the European Union, an ex-ante analysis on the INVEST programme “Grant for Venture Capital” (“INVEST-Zuschuss für Wagniskapital”) has to be carried out after 10 years of programme duration in order to check whether there is a need for extension or adjustments. This ex-ante analysis should examine and evaluate whether INVEST is still necessary and suitable to address a market failure in the venture capital market for young companies and whether it contributes to mitigating or even remedying a market failure in the business angel market. A market failure consists in promising young companies not receiving enough capital to implement innovative projects or to enter the market with a new product. The insufficient supply of capital in the capital market can also prevent the creation of innovative companies.

The tasks of the project were carried out by a project team consisting of staff members of ZEW - Leibniz Centre for European Economic Research - as main contractor - and Technopolis Deutschland - as subcontractor of ZEW.

The study consisted of three tasks. In the **first module**, a qualitative analysis was conducted to determine the extent to which there is a market failure in the business angel market and whether the INVEST programme in its current form (funding guideline of 21.12.2020¹ (BWWi, 2021)) - against the background of the EU Commission's risk finance guidelines (version 16.12.2021)² - is justified.

The **second module** of the study quantitatively investigated whether INVEST is necessary, suitable, has an incentive effect, and is appropriate to address or alleviate the given market failure. To answer the various research questions, a comprehensive research data set was prepared, which was fed from various

¹ A new funding guideline came into force on 1.3.2022 (BMWK, 2022).

² Official Journal (2021/C 508/01)

sources: the INVEST funding database of the BAFA³ with information on the investors and companies that received funding, the Mannheim Enterprise Panel of the ZEW and the company survey IAB/ZEW Start-up Panel.

In the **third module** of the study, it was discussed whether changes to the INVEST funding guideline could contribute to increasing efficiency and which changes would be required. Recommendations on changes to individual aspects of funding were derived from the analyses and discussed.

Conclusions on the possible future design of the INVEST programme were elaborated by the evaluation team. According to the authors, those changes discussed, would increase the possibilities to mitigate market failures, where this is not yet or not sufficiently the case with the previous measures of the INVEST programme.

This short version of the study report begins by briefly explaining the motivation behind INVEST and this ex-ante evaluation, summarises the main findings of the project and presents its conclusions for the design of the INVEST programme.

2 Motivation

The INVEST programme was introduced in 2013 and is aimed at equity investors investing in young innovative companies. Equity investments in these companies are subsidised with 20% of the investment amount (acquisition subsidy). Furthermore, taxes on capital gains from subsidised investments can be reimbursed with a lump sum subsidy (exit subsidy).

INVEST aims to mobilise early-stage investments by business angels in innovative SMEs or start-ups. Two specific goals are pursued:

³ The INVEST funding dataset, which was made available to the evaluation team by the project executing agency, the Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA), for its own analyses, contains information on all applications received for INVEST funding in the period from 2013 to 2021.

1. Motivation and incentive for existing and, above all, new business angels to make or expand investments in young innovative companies, and thus also to contribute to strengthening the business angels scene in Germany.
2. Better access to venture capital for young companies.

The existing INVEST programme was notified and approved on the basis of Article 107 (3) c AEUV and the EU Commission's Risk Financing Guidelines of 22 January 2014.⁴ According to point 124 of these guidelines, an ex-ante analysis must be carried out for INVEST from the year 2023. For the statistical analyses provided for this purpose, the development of the corresponding criteria as well as the qualitative review of the fulfilment of the criteria are required.

In principle, it would also be conceivable to allow INVEST to fall under the “Allgemeine Gruppenfreistellungsverordnung” (AGVO). INVEST does not exceed the maximum amount of EUR 15 million set in the AGVO for the total investment for each beneficiary company and also fulfils all other requirements. Only the fact that INVEST is not a tax incentive but a grant contradicts the requirements of the AGVO. In principle, there are no indications that these two formal programme designs differ in their economic effect.

The current Risk Financing Guidelines of the EU Commission dated 16.12.2021 (in force since 1.1.2022) provide seven criteria that can be subsumed under the two conditions listed in Article 107 (3) c AEUV that a risk financing measure must fulfil in order to be approved:

Condition 1: Aid facilitates the development of an economic activity

- **Identification of the supported economic activity**
- **Incentive effect:** Do the subsidy-receiving investors change their behaviour and take up additional activities that they would not have taken up without the subsidy?

⁴ In the meantime, there are new risk financing guidelines from the European Commission (2021/C 508/01).

Condition 2: Avoidance of adverse effects on trading conditions to an extent contrary to the common interest.

- **Necessity:** Is there a market failure that the subsidy aims to address?
- **Appropriateness:** Is the subsidy appropriate to achieve its intended objective?
- **Proportionality:** The subsidy is limited to the minimum necessary additional investment or activity.
- **Avoidance of undue negative effects on competition and trade between Member States:** The overall effect of the subsidy is positive and the negative effects are limited.
- **Transparency:** Commission, Member States, economic stakeholders and the public have easy access to all relevant rules and information on the subsidy.

Within the framework of the evaluation project, these seven criteria will be addressed to justify an extension of the INVEST programme from 2023 onwards. It will be qualitatively and quantitatively examined whether the criteria are fulfilled. In particular, the question will be addressed as to whether there is still a market failure due to insufficient capital supply in the German business angel market and whether these financing bottlenecks for young innovative companies make government action necessary.

3 Results and classification in the risk financing guidelines of the EU Commission

By 6.10.2021, 11,188 applications from 5,874 investors, including 2,197 investment companies, had been funded (Table 1). If we add up all individual investors and persons who received funding via an investment company, we arrive at a figure of 7,755 investors. The share of these INVEST investors in all investors in eligible industries is 24% and in all investors in all industry sectors 8% (according to the Mannheim Enterprise Panel of the ZEW). In the period from 2013 to the

beginning of October 2021, a good 5,300 companies received an INVEST eligibility certificate from BAFA at least once.⁵ Indirect funding was provided to 2,316 companies, which together received 3,615 funding applications.

Table 1 Overview of research data on INVEST funding: 2013 - beginning of October 2021⁶

	Number of funded applications	Number of beneficiaries supported
Companies	3.615	2.316
Investors	11.188	5.874
<i>of which: investor companies</i>	<i>4.399</i>	<i>2.197</i>
Total beneficiaries	15.587	7.755

Source: INVEST funding database

An essential task of this evaluation study is to verify whether the INVEST programme fulfils the risk financing guidelines of the EU Commission and is thus compatible with the competition rules of the Treaty on the Functioning of the European Union (esp. Art. 107 para. 3 c) AEUV). This review was carried out in this study by means of both a qualitative assessment of the necessity of the funding programme and a quantitative analysis of its impact. The results are summarised and evaluated below according to the criteria of the Risk Financing Guidelines.

3.1 Identification of the supported economic activity

The INVEST programme is aimed at young innovative companies.

⁵ Between 2003-2021, according to the Mannheim Enterprise Panel of the ZEW, a total of approximately 620,000 companies were founded in the INVEST-eligible sectors that would potentially be INVEST-eligible since the introduction of INVEST in 2013. Just under 0.9% of these start-ups have received an INVEST eligibility certificate.

⁶ The INVEST funding dataset, which was made available to the evaluation team by the project executing agency, the Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA), for its own analyses, contains information on all applications received for INVEST funding in the period from 2013 to 2021.

The company must be a small enterprise as defined by the EU Commission. It must have fewer than 50 employees (full-time equivalents) and an annual turnover or balance sheet total of no more than 10 million euros, as well as be active in an innovative business field. Innovative activity can be demonstrated by assignment to a sector defined as innovative. Outside of these industries, a company can prove its innovative character through further predefined criteria.

3.2 Incentive effect

The supported investors change their behaviour and take up additional activities that they would not have taken up without INVEST.

The online survey conducted as part of the INVEST evaluation 2019 shows that the INVEST programme does have free-rider effects. However, these are offset by clear mobilisation effects, so that overall there is a clear net mobilisation of venture capital through INVEST. Overall, the evaluations of both 2019 and 2016 identify a positive net leverage effect of the funding of around 50%: The investors as aid recipients have not only passed on the INVEST acquisition grant to the companies, they have also increased it by half. On average, INVEST led to investors changing their behaviour and making investments they would otherwise not have made or increasing their investment amounts. On average, the companies as the final recipients of the aid were able to obtain financial resources through INVEST that they would not have received without INVEST, or not to the same extent.

Using data from the IAB/ZEW Start-up Panel, this study investigated how much more young innovative firms have gained access to equity capital through the INVEST programme. Using a difference-in-differences approach, it was possible to show that after the introduction of the INVEST programme in 2013, the proportion of firms with equity financing in the eligible sectors increased significantly compared to a control group. **The probability of receiving equity capital has increased by an average of 37% for companies in eligible industries as a result of the INVEST programme.**

Within the framework of control group analyses, INVEST-funded companies were compared with a control group of similar companies. This means that the control group is made up of companies that are not funded by INVEST, but are

innovative, have received equity capital from external investors and are generally eligible for INVEST funding. It could be shown that **INVEST-funded companies received on average 55% to 61% more financing from their investors than other young, innovative companies**. The two different treatment effects of 55% and 61% are due to the different matching procedures used for the control group analyses (cf. Table 3 in section 3.5). This illustrates the robustness of the positive treatment effect. Since the treatment effect is clearly above the subsidy level of 20%, the subsidy programme does **not** seem to produce **any free-rider losses on average** and even mobilises more capital than would be expected from the subsidy.

However, if we look at the group of funded companies in detail, we find **free-rider effects for investors in companies that received comparatively high amounts of investments**. This result was found through a quantile regression; in this, the treatment effects were estimated for different areas of the distribution of investment sums by external equity investors, i.e. separately for investment capital sums of different sizes. The effect of INVEST funding is significantly stronger for smaller amounts of financing, especially below the 20% quantile of the distribution. **For firms with the 10% smallest values, the treatment effect is highest, at about 176%**: INVEST-funded firms have thus received 1.76 times the amount of external equity funding through the INVEST grant at this point in the distribution compared to the control group firms. However, one reason for the disproportionately high treatment effect at the 10% quantile is very likely to be the minimum investment amount of 10,000 Euros set by the INVEST programme until 1.3.2022.

The treatment effect decreases with larger financing amounts. From the **75% quantile of the distribution, in which companies received at least 300,000 Euros from their investors, no INVEST treatment effect can be observed**. In summary, it can be said that clearly positive financing effects are generated by the funding programme. However, these are more pronounced for small investment amounts below 25,000 Euros than for those above 100,000 Euros.

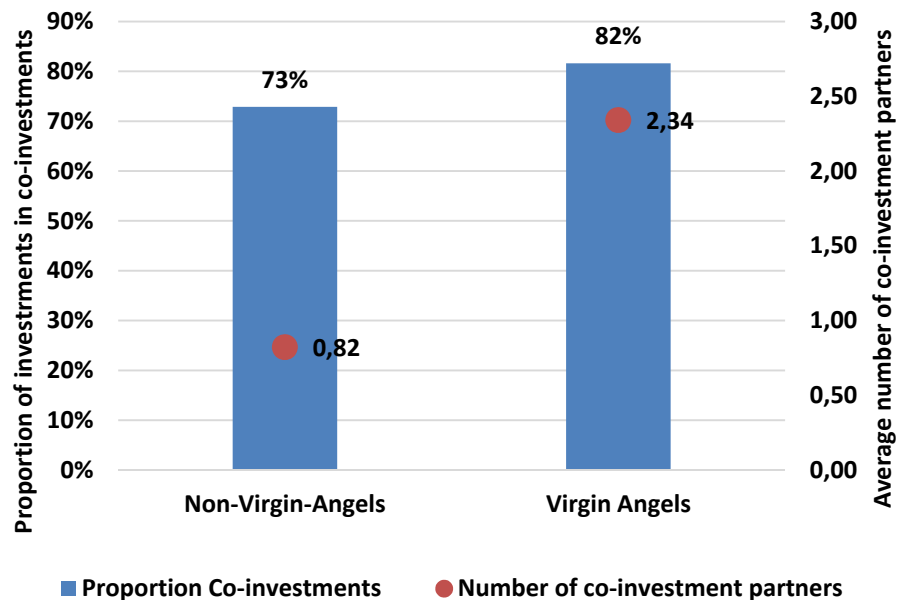
73% of the company investments funded by INVEST take place in a team with other investors. This is shown by evaluations with the Mannheim Enterprise Panel. These co-investments are more frequent among INVEST-funded investors than among other investors, only about half of whom are involved in co-

investments. The share of co-investments in all INVEST-funded equity investments has increased over time. The development for investments not promoted by INVEST points in exactly the opposite direction. This indicates that professional business angels are now regular participants in the INVEST programme.

Evaluations with the Mannheim Enterprise Panel also show that public equity investors such as Hightech-Gründerfonds (HTGF) and Coparion are also involved in about 22% of the INVEST-funded companies. This concerns about 400 investments. **The fact that a high proportion of Virgin Angels are involved in these co-investments speaks in favour of the possibility of co-investments by INVEST-funded investors and public investors acting pari passu with non-aid market-economy investors, and thus a sustainable revitalisation of the business angel market is taking place to a particular degree.** While the share of Virgin Angels among INVEST-funded investors is 41% overall, it is 88% for HTGF investments, 85% for Coparion and 92% for other public investors.

Around 41% of the investors supported by INVEST are new investors, so-called Virgin Angels. This result emerges from an analysis of data from the Mannheim Enterprise Panel. Virgin angels were not active as private investors in young companies before their first INVEST-funded investment. The average investment amounts of Virgin Angels are somewhat lower than those of experienced investors. **More than four-fifths of Virgin Angels participate in co-investments;** on average, they cooperate with more than two investment partners in a company (Figure 1).

Figure 1 Proportion of investments in co-investment and average number of co-investment partners



Source: Mannheim Enterprise Panel (MUP), INVEST funding database

On average, non-Virgin Angels have only one other investment partner. This result is positive: **Virgin angels apparently invest their money specifically in projects that they have selected together with experienced investors.** They can therefore rely on the expertise of experienced investment partners. For their part, the young companies benefit from the additional capital and at the same time from the know-how of the experienced business angels. **About one third of the Virgin Angels have invested in young companies several times. They are therefore still active in the venture capital market and thus, the INVEST programme also seems to sustainably stimulate the German business angel market.**

The treatment effect of the exit grant was also estimated in this project. In order to capture the incentive effect, a discrete choice experiment was conducted: 138 investors answered an online questionnaire that presented hypothetical investment scenarios in young innovative companies. The respondents were asked to choose the best investment object from 3 investment options. This

decision situation was repeated several times with different, randomly composed investment attributes. The attributes of the investment alternatives differed with regard to the investment amount, the expected return, the ecological contribution of the company's product, the time until the first sales are achieved and the two grant options, the acquisition grant and the exit grant. In this way, the aim was to find out which funding instrument has a stronger incentive effect on start-up investors. Different types of investors were considered, i.e. a distinction was made between experienced and inexperienced investors and between high and low investment amounts.

The result of the discrete choice experiment suggests that there are incentive effects from both grant types and that the incentive effects are somewhat more pronounced for inexperienced investors than for more experienced ones. However, there is little evidence to suggest that one of the two grant options produces a stronger incentive effect than the other.

Interviews with experts and investors also confirm the impression that incentive effects emanate from both the acquisition grant and the exit grant and that no order of preference can be established.

3.3 Necessity

It is very likely that without the INVEST programme there would be a market failure in the venture capital market for young companies.

The findings from literature, secondary data and interviews underline (not least because of the numerous measures taken by the public sector to strengthen venture capital investments) an overall clearly positive development in the financing situation of young companies. Both the venture capital market as a whole and the business angel segment have shown strong growth in recent years. However, in international comparison, especially to the UK or the USA, the German market continues to record lower volumes. International comparisons of this kind as well as theoretical models do provide indications of the existence of frictions (or efficiency losses) in the early-stage market, but these are not empirically verifiable for the current German market situation. However, based on the findings from interviews and literature, frictions or financing bottlenecks can still be found in some specific segments despite the existing public measures to promote venture capital. This concerns capital-intensive, high-risk

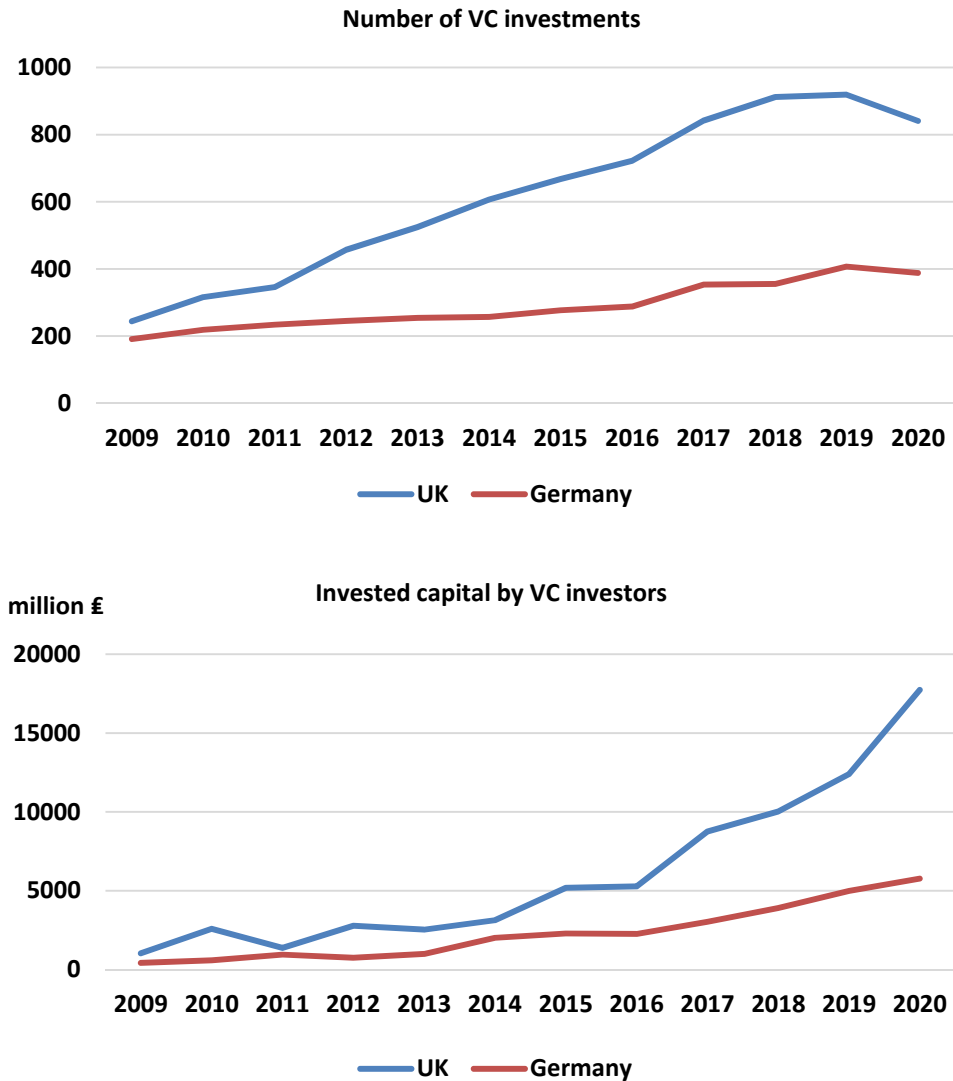
and slow-scaling industries with long development cycles, especially in the hardware sector. The financing situation is also sometimes more difficult in certain geographic regions or for highly visionary ideas. According to one interviewed expert, barriers to entry for potential investors lie in finding a suitable network or suitable investment partners to make investment decisions and determine the right degree of diversification.

A comparison of the development of the venture capital market for young companies in Germany and the UK based on Pitchbook data shows much stronger growth and higher funding amounts in the UK (Figure 2).

However, the different institutional frameworks and tax laws of the two countries must be taken into account, which result in more investment in young companies in the UK. In addition, nothing can be said at this point about the innovative activity of the companies that benefit from additional financial capital in the UK through tax breaks for their investors, and thus their added value for the national economy. Whether more innovative and growth-oriented young companies are actually reached in the UK, and thus whether innovations are generated to a greater extent than in Germany, cannot be determined on the basis of the data available.

The fact that Germany has caught up since the INVEST programme came into existence in 2013 is made clear by this study: since 2013, the share of companies with venture capital financing in the treatment group of eligible companies has grown statistically significantly more than the corresponding share in a control group of non-eligible companies. The stronger growth of companies in the treatment group can be attributed, among other things, to INVEST funding. That is, without INVEST funding, fewer young companies would have benefited from venture capital financing and the financing gap would have been larger. It can therefore be concluded that without the INVEST programme there would be a clear market failure for the financing of young innovative companies.

Figure 2 Number and volume of venture capital (VC) investments in the seed and early-stage phases - Germany and the United Kingdom in comparison



Source: Pitchbook, own representation.

The actual amount of the financing gap, i.e. the difference between the demand for venture capital and the amount actually available, is not known. Therefore, no statement can be made as to whether INVEST was able to close this financing

gap completely.⁷ In order to continue to improve the supply of venture capital, the authors of this study consider support for young innovative companies to be necessary.

3.4 Appropriateness

INVEST is suitable for achieving the intended objective of the aid.

In the form of a grant for investors who operate independently on the market and invest up to 80% of their own money, and who invest according to market conditions, INVEST can basically be assessed as a suitable instrument. There is no comparable measure in the financing landscape at the national level, but there are several ones that also aim to close the supply gap in the early-stage market.⁸

In order to be a suitable instrument for addressing frictions in the early-stage market, it also seems helpful that INVEST grant-receiving investors have sufficient skills and market knowledge, e.g. their own industry, start-up or investment experience, to be able to select promising investment objects ("screening" skills). This is not immediately obvious from the current state of the data, even if one could assume that investors acting with their own money and risk would fulfil these requirements in a perfect market. It seems desirable that INVEST reaches the "classic", active business angels who provide start-ups not only with financial resources, but ideally also with advice and expertise ("smart money"), or who facilitate corresponding access through their networks. The results of the online survey in 2019 show that this is the case for a large part, but not for all investments.

Analyses of the sample of companies surveyed in the 2016 INVEST evaluation and linked current data from the Mannheim Enterprise Panel made it possible to examine the development of start-ups in the 2003-2015 cohorts. In the process, INVEST-funded companies are compared with non-funded companies, which, however, would in principle be eligible for funding due to their industry

⁷ In this study, it is further shown that INVEST-funded enterprises are more likely to complain about financing difficulties than others.

⁸ The EAF programme also aims at business angels, but is designed differently.

affiliation and their innovation activities. For INVEST-funded companies, a higher probability of survival, higher employment growth, a better credit rating and a higher probability of follow-up financing by additional equity investors can be observed. While these results cannot be causally attributed to INVEST funding, they do demonstrate the selection effect in the INVEST programme. **The investors supported by INVEST have selected companies with growth potential.** It cannot be completely ruled out that the companies would not have developed similarly without the INVEST measures. What is clear, however, is that INVEST funding has not, on average, flowed into unsuccessful companies.

An analysis of the innovation activity of young enterprises with the data of the IAB/ZEW start-up panel makes it clear that in the sectors defined as innovative according to INVEST a significantly higher proportion of enterprises can be classified as innovative than in the other sectors (53% to 32%, Table 2).

Table 2 Characterisation of young enterprises according to sector groups

Company types	Innovator share	Proportion of companies with financing difficulties	Proportion of innovators with financing difficulties
Sectors defined as innovative according to INVEST*.	53%	15%	18%
other industries*	32%	12%	14%
with VC in sectors defined as innovative according to INVEST*	91%	k. A.	k. A.
with VC in other sectors*	65%	k. A.	k. A.
INVEST funded**	96%	48%	49%
not INVEST funded in innovative sectors**	56%	22%	28%

*Values extrapolated to the population of the 2015-2018 foundation cohorts

**Sample of the founding cohorts 2007-2018

k. A.: no information possible due to small sample size

VC (Venture Capital) - external equity capital provided by private investors and VC companies.

Source: IAB/ZEW Start-up Panel, INVEST funding database

An evaluation of the sample of companies whose investors have received an INVEST grant also shows that it consists almost entirely of innovators (96%). Among the non-grant recipients who are active in sectors defined as innovative, only 56% are innovation-active companies. **INVEST therefore actually reaches essentially innovative companies with the sector affiliation as proof of innovation. In addition, with the sector classification, INVEST funding primarily reaches those sectors for which the financing gap is particularly high and thus where market failure exists to a greater extent.**

In addition, a stimulation of the venture capital market for young companies was achieved through the incentivisation of Virgin Angels (cf. section 3.2 on the "incentive effect"). A good two-fifths of the funded investors were identified in this study as new entrants to the venture capital market for young innovative companies, of which one-third subsequently invested at least once more in young innovative companies.

In addition to the financial resources that investors provide to young innovative companies, the entrepreneurial support provided by business angels also plays an important role in their development opportunities. INVEST potentially increases the investment activity of a business angel, which could lead to an expansion of the portfolio size. As a result, each investor could spend less time on a single company. Furthermore, Virgin Angels enter the market with less support services to offer due to a lack of experience. Analyses of the portfolio size of investors with the Mannheim Enterprise Panel actually show that after the introduction of INVEST, the number of portfolio companies has increased slightly for INVEST-funded companies. **However, a decline in support activities for young companies since the introduction of the INVEST funding programme cannot be found in the data of the IAB/ZEW Start-up Panel.** This can be explained by the increased syndication behaviour of investors. Virgin Angels in particular often partner with other, experienced investors. This makes it possible to leverage larger financing sums and at the same time companies can benefit from the support offered by experienced investors.

With the help of the Mannheim Enterprise Panel, it was calculated how long investors hold their stakes in companies on average. INVEST-funded investors have the requirement to remain invested in the funded companies for at least three years if they do not want to repay the acquisition grant. **In the case of non**

INVEST-subsidised participations, the average holding period is less than three years. The INVEST requirement therefore definitely represents a restriction. According to the statements of the experts and investors surveyed, however, the requirement for a minimum holding period is not viewed negatively. There is no obvious disadvantage for investors and companies due to the minimum holding period.

3.5 Proportionality

INVEST is limited to the minimum additional investment or activity required.

As already shown above under the criterion of the incentive effect, on average no free-rider effects can be observed from INVEST funding recipients. On closer examination, however, it becomes clear that **investors with comparatively high financing amounts tend not to pass on the acquisition subsidy to the young companies, i.e. free-rider effects are likely.**

Within the framework of the control group analyses, a further distinction was made between initial and follow-up investments, which were also eligible for funding until 1 March 2022. For this purpose, a differentiation was also made in the control group between initial and follow-up funding (Table 3). The result indicates that **treatment effects through INVEST funding can be proven predominantly for initial investments. For follow-up investments, mobilisation effects are marginal compared to the mobilisation effects for initial investments.** I.e. INVEST-funded companies have no obvious additional benefit from the grant for follow-up financing.

Table 3 Financing effect through INVEST grant

	Entropy Balancing			Coarsened Exact Matching		
	All invest-ments	VC initial invest-ments	VC Follow-up invest-ments	All invest-ments	VC initial invest-ments.	VC Follow-up invest-ments
INVEST grant	0,55***	0,59***	0,48	0,61***	0,54***	0,09
t-value	(6,18)	(6,47)	(1,50)	(4,47)	(4,53)	(0,20)
N	701	471	228	456	303	81

Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Weighted linear regressions, all models include fixed effects for industry and year of observation.

Covariates for entropy balancing: Dummy variables for team formation, exit experience and experi-

ence founding a company, founders with doctorate, academic background, female founders, opportunity founding, patents when the company was founded, support through grants or loans, public equity capital, company turnover, industry experience in years, average age of founders, number of employees when the company was founded.

Source: IAB/ZEW Start-up Panel, INVEST funding database

Since 2017, convertible loans have also been eligible for an INVEST grant as soon as they are converted into equity investments. According to experts and investors interviewed for this study, convertible loans are a popular instrument for financing young companies. Convertible loans have steadily increased in importance since the announcement of eligibility within the INVEST programme. While in 2017 the share of convertible loans in all funded applications was only 14%, this share recently reached 41%. Convertible loans are considered a financing option for particularly risky investment projects and are thus, according to the academic literature, relevant and suitable for projects that could generate radical innovations. The analyses carried out here draw on the creditworthiness index of the credit agency Creditreform, which measures the creditworthiness of companies. **Indeed, it shows that companies with a poorer credit rating - and a correspondingly higher risk of default - are more likely to be financed through convertible loans. The eligibility of convertible loans is thus necessary in order to also reach enterprises with particularly high risks, which are at particular risk of market failure.** It is also evident that convertible loans are more likely to be used to finance younger (up to 3 years old) enterprises. When interpreting this result, it must be borne in mind that a causal relationship cannot be proven. It remains unclear whether financing via convertible loans takes place due to a poorer rating or whether the poorer rating is the result of a lower equity capitalisation of the companies.

Another advantage of convertible loans concerns the young companies themselves. It is discussed in the literature that young companies prefer convertible loans to equity financing because the investment risks for the investors are compensated more by the interest rate of the loan and less by the shares in the company that are promised to investors at the time of the loan agreement. **In fact, it shows that INVEST-funded companies which are up to 2 years old lose on average significantly fewer shares to investors when financing themselves via convertible loans than it is the case with direct equity financing.** While, for example, in the case of equity financing in the year the company was founded,

an average of 4.5% shares were given to investors, this applies to only 2% for convertible loans that have already been converted. For older enterprises, 3 years and older, a difference in the amount of share ownership between immediate equity investment and convertible loans is not observed.

There are indications that due to the uncertainty about the value of the company, especially in the start-up and seed phase, convertible loans are used by investors to reduce risk and that the young companies benefit from this because they have to give up fewer shares in the company and thus also fewer rights of participating in decision making.

3.6 Avoidance of undue negative effects on competition and trade between Member States

The overall effect of INVEST is positive and the negative impacts are limited.

Taking a look at the growth of the economic sectors addressed by INVEST on the basis of the development of their gross value added, it becomes apparent that they have largely shown strong growth over the past 10 years. Thus, there is little evidence on distorting effects on competition.

As already explained above under the criterion "appropriateness", no significant effects can be identified with regard to management resources provided by business angels. Hypotheses to the effect that investment grants have a negative impact on the level of management support for companies are thus not confirmed.

INVEST fulfils the requirements of the formal design examined here with regard to the avoidance of excessive negative effects.

3.7 Transparency

Commission, Member States, economic shareholders and the public have easy access to all relevant rules and information on INVEST.

All necessary information, i.e. the full text of the decision to grant the individual aid or the approved aid scheme and its implementing rules (funding guideline), is provided on BAFA's website.

INVEST fulfils the criterion of transparency.

4 Conclusions for the design of the INVEST programme

The results of this evaluation study show that both the number and the volume of venture capital investments in young innovative companies have increased along with INVEST. Furthermore, 41% of the funded investors were identified as Virgin Angels. As of 1 March 2022, the INVEST funding guideline has been adjusted because the application volume has increased so much that it would significantly exceed the budget for INVEST if no countermeasures had been taken. From now on, follow-up financing is no longer eligible. The acquisition grant is reduced to 10% in the case of convertible loans. The minimum investment amount is raised from € 10,000 to € 25,000.

Against the background of the analysis results obtained as well as the recent increase in funding applications and the limited funding resources, the changes already made in March 2022 and further potential adjustments are discussed below.

4.1 Adjustment of targets and performance indicators

The changes to the funding guideline for further programme optimisation should be geared towards further reducing free-rider effects of INVEST funding and towards a sustainable stimulation of the business angel market. They should also promote the supply of venture capital to young innovative companies and thus alleviate their financing bottlenecks. By reducing free-rider effects, it can be ensured that the programme is not designed too generously to achieve the goal of remedying market failures. The previous objectives of INVEST could therefore be defined in the future as follows:

1. motivation and incentive for inexperienced business angels (especially Virgin Angels) to make investments in young innovative companies (portfolio building) and thus also a sustainable strengthening of the business angel scene in Germany (see chapter 4.3)
2. better access to venture capital for young innovative companies

The continuation of a monitoring of INVEST is recommended, which - as before - uses performance indicators to regularly check whether the targets have been

achieved. The performance indicators could be partially adjusted taking into account the results and conclusions of this study and the previous studies in 2016 and 2019. For a sustainable impact and efficient use of funding, the following adjustment of the performance indicators is proposed:

1. For a long-term stimulation of the business angel market, a minimum number of Virgin Angels using INVEST per year should be set. Due to a limited number of future potential new investors, this indicator should be set below the previous annual average of about 300.⁹ The threshold of 100 Virgin Angels set in the INVEST performance indicator could thus be maintained.
2. In order to have an impact on the business angel market, it is essential that INVEST triggers a certain mobilisation effect among the target group of business angels. The INVEST mobilisation effect of 50%, which was calculated in the previous evaluations in 2016 and 2019, should not be undercut in the future.
3. At least 25% of INVEST-supported enterprises should perceive an improvement in their financing situation (more capital, faster access to financing).
4. At least 10% of INVEST-supported companies should state that they would not have received financing from private investors without INVEST support.

The previous performance indicators for the utilisation of INVEST (1,000 companies and 1,200 investors per year) were useful at the beginning of INVEST almost 10 years ago in order to be able to check the demand for INVEST and thus also elaborate on an appropriate design of the programme for the target group. After almost 10 years on the market, however, the funding measure is well-known and the recent sharp increase in demand for the programme (which

⁹ The Virgin Angel potential for Germany could be estimated by calculating the number of wealthy former or active entrepreneurs in Germany. These people are a suitable target group for recruitment as investors in young companies.

has had to be countered since March 2022 with restricted programme conditions so that the available budget funds remain sufficient) make performance indicators with targets for the utilisation of the programme appear obsolete.

4.2 Follow-up financing

Not surprisingly, most of the interviewees were in favour of subsidising a follow-up round. Some of the interviewees also expressed the opinion that a follow-up round should only be subsidised if the first round was not subsidised, so that there is no double funding.

Investor loyalty is also promising in the eyes of several respondents. A follow-up investment expresses trust in other investors. From the company's point of view, the question is how many investors it wants to have, or how much influence larger investors can exert. With fewer new investors, the group of shareholders remains manageable; new investors or contact persons could bring unrest into the shareholder meetings. Other interviewees see no effect of investor loyalty for the companies or emphasise the relevance of the lead investor, whose incentive to continue investing does not depend on a subsidy; thus a free-rider loss is very likely.

The evaluation's online survey from 2019 also shows broad support for the eligibility of follow-up investments, especially if an investment was made in the first round. Nevertheless, the evaluation concludes that **funding should be designed in such a way that it exerts a maximum incentive effect. This is not always plausible for follow-up investments.**

Control group analyses did not find a significant treatment effect of the support of follow-up financing, whereby follow-up financing is to be seen from the perspective of the companies. This does not yet provide clear evidence of the ineffectiveness of the support measure for follow-up financing, since in the analyses presented here it was not possible to distinguish whether follow-up financing was supported by the same investor due to a lack of observations. However, an indication of a prevailing average free-rider effect in the case of follow-up financing can be derived from this. This result contrasts with the average positive treatment effect of the acquisition grant in the case of - from the companies' point of view - initial financing.

We therefore welcome the amendment to the INVEST funding guideline to limit funding to initial investments in a company.

4.3 Virgin Angels

Furthermore, it became clear that the largest positive treatment effects were measured in smaller investments, while for larger investment sums there is rather a high probability of free-rider effects. This means that it can be assumed that investors with above-average investment sums would have invested to the same extent even without the INVEST grant. On average, Virgin Angels make somewhat smaller investments than experienced investors. This means that, on average, the free-rider loss for Virgin Angels is lower than for serial investors. Furthermore, it can be assumed that the willingness of experienced investors to finance has been exhausted. The portfolio sizes of the INVEST funders have increased, and the incentive effect of INVEST has possibly already reached the limit of the established investors. A comparison with the UK also shows that although investors in Germany invest similarly high amounts per company as in the UK, significantly fewer investments are made in young companies here. Increasing the number of business angels in Germany could possibly bring the German market closer to the British market. The INVEST programme is presumably no longer in a position to increase the investment sums among professional business angels, whereas there is still potential in the group of wealthy individuals, especially from the environment of entrepreneurs or former entrepreneurs with corresponding industry experience, to incentivise them to enter the venture capital market for young innovative companies.

Should a further monetary restriction of the INVEST funding measure become necessary, it would make sense to restrict the funding to Virgin Angels or inexperienced investors in order to introduce private individuals to the business angel market and thus also stimulate the German business angel market in the long term.

If INVEST funding were restricted to Virgin Angels, the administrative hurdles would also have to be taken into account. BAFA would have to check or at least demand a self-declaration on whether an investor is a newcomer to the venture capital market for young companies. However, it seems reasonable to assume

that at this point in time, the INVEST programme is well-known to every professional business angel. And all experienced investors who have not yet applied for the INVEST grant - presumably for understandable reasons from their point of view - will probably not do so in the future either. Investors who apply for funding for the first time in the future are therefore very likely to be Virgin Angels anyway. Instead of stipulating in the funding guidelines that the investor must be a Virgin Angel, it would therefore be more practical to stipulate in the funding guidelines that the investor has not previously received INVEST funding.

When making this recommendation, however, it is important to bear in mind that the willingness of Virgin Angels to invest might not be sustainable if further investments in young companies were no longer supported. After all, 80% of the second investments by Virgin Angels were also funded by INVEST. It would possibly remain a one-time start-up investment if only supported once. In terms of funding policy, it makes sense for inexperienced investors not to invest just once, but to be able to build up a small portfolio in order to minimise risk.

Multiple investments by Virgin Angels or inexperienced investors could be encouraged by funding not only the first investment, but the first few investments, or by setting a fixed total funding budget for each investor that he/she could draw on in the context of multiple funding applications.

4.4 Convertible loan

Analyses with the Mannheim Enterprise Panel indicate that comparatively risky investments in young innovative enterprises are more likely to be financed through convertible loans. Since it is precisely such business projects that are confronted with extraordinary financing difficulties, the probability of market failure is presumably particularly high in this area. The support of convertible loans is therefore a suitable instrument to reduce market failure.

In March 2022, the acquisition grant for convertible loan financing was reduced from 20% to 10%. To what extent this will have an impact on the number and amount of investments made is not yet foreseeable. It is conceivable that more investors will opt for direct equity financing than for convertible loan financing because these are now more attractive than convertible loans. This could be disadvantageous from the start-ups' point of view, because a company valuation must now be carried out at an early stage and presumably more shares

must be ceded to investors. However, it is also conceivable that the amendment will not lead to any changes in investment decisions because, overall, convertible loans are still more attractive, especially from the point of view of companies. In this case, the amendment could reduce free-rider profits.

Overall, however, the analysis results of this study suggest that unequal treatment through different levels of acquisition grants for direct shareholdings and convertible loans is not justified. Therefore, direct equity acquisition and convertible loans should be promoted equally (with an equally high acquisition grant).

4.5 Funding limits

Quantitative control group analyses conducted as part of this study come to the conclusion that treatment effects of INVEST funding decrease with increasing investment volumes and thus free-rider effects increase. **For an efficient design of the INVEST funding programme, consideration could therefore be given to reducing the maximum investment amount to be funded per investor.¹⁰**

Smaller investments thus achieve a greater treatment effect. Treatment effects are still significantly - albeit weakly - positive up to €100,000. By raising the funding limit to €25,000, which happened on 1 March 2022, companies with high costs that are caused either by capital-intensive investments or by high costs for research and development projects may be addressed more specifically.

In contrast, in section 4.3 it is explained why limiting the funding to Virgin Angels could make sense in order to reduce the free-rider effects of the INVEST programme. The funding limit, which has risen to €25,000, may severely limit the circle of potential Virgin Angels and, as shown above, there is a comparatively high recruitment potential in the area of (relatively) low investment sums.

Weighing up these two arguments for and against a low entry threshold in favour of reducing the free-rider loss, it **is proposed here to reduce the eligibility**

¹⁰ Previously: A maximum of € 500,000 per investor per year can be subsidised.

limit for the acquisition grant again to a minimum level of €10,000 per investment.

4.6 Minimum holding period

The average holding period for investments not supported by INVEST is less than three years. The INVEST requirement therefore definitely represents a restriction. However, a longer average holding period for INVEST-supported companies does not seem to have an effect on the **support performance**.

Another argument in favour of lowering the minimum holding period in the INVEST programme would be a potentially negative effect on follow-up financing if other investors were deterred by the continued participation of the funded (initial) investors. But: The analyses on the probability of follow-up financing of INVEST companies suggest that **INVEST-funded companies have fewer problems obtaining follow-up financing than non-funded control group companies**.

The 2016 and 2019 INVEST evaluations also show that a large proportion of investors do not object to the INVEST requirement for a minimum holding period.

Overall, the research conducted in this study does not support a change in the level of the minimum holding period.

4.7 Industry focus

In the course of an analysis of the long-term effect of the INVEST programme, it was shown that INVEST essentially reaches the target group of innovative growth-oriented companies. The proof of eligibility via the industry sector is easy to carry out for all parties involved - i.e. the companies and BAFA. On the other hand, almost one third of all funded enterprises were able to prove their eligibility - i.e. innovation activity - via expert appraisals, other project funding or patents. Again, against the backdrop of the limited financial resources made available to the INVEST programme by the legislator, one could also imagine limiting the aspect of eligibility on the part of the companies and only define those companies as eligible for funding that directly prove their innovation activity, be it through patents, through participation in research funding programmes, through innovation awards received or through an expert appraisal.

The industry focus could then be dropped, but the group of innovative enterprises would be more restricted than before.

Possibly, the funding programme would then target the companies with the best development potential, i.e. radical innovative ideas and high growth potential. In other words, the funding programme would more specifically address those companies that have the potential to become so-called "unicorns".

On the other hand, the analyses show that most of the companies funded by INVEST are innovation-active because the investors have implicitly made this selection. Accordingly, there is not necessarily a need for a direct innovation review in order to reach the target group of innovative companies. In addition to the high administrative costs that would be associated with a review process, the requirement of proof of innovation also entails the risk of excluding companies that are still very young or in the start-up phase and cannot (yet) provide proof of innovation activities. This would reduce the development opportunities of these target group companies.

In the overall view, the authors continue to recommend the possibility for companies to obtain eligibility¹¹ by industry affiliation.

4.8 Acquisition and exit grant

As part of a discrete choice experiment, 138 investors were asked about their investment behaviour. They were asked to choose the best option several times between fictitious investment scenarios in young companies. Among other things, the scenarios offered a choice between the acquisition grant and the exit grant as funding options. It was shown that the investment decision of investors is positively influenced by both the acquisition grant and the exit grant. Accordingly, the exit grant has an additional positive effect on the investment amounts that flow into young companies.

As a result, it is recommended to maintain the exit grant under the INVEST programme.

¹¹ In addition to the other funding requirements that have not been addressed or questioned here.

Furthermore, the discrete choice experiment showed that the incentive effect of the acquisition grant is somewhat more pronounced for inexperienced investors than for more experienced ones. Accordingly, an increase in the acquisition grant would trigger a comparatively stronger treatment effect for Virgin Angels.

Accordingly, an increase in the acquisition grant for Virgin Angels could be considered in order to further increase the incentive or mobilisation effect of INVEST.

4.9 Crowdfunding

Another task of this evaluation was to discuss whether an extension of INVEST funding to the financing form of 'crowdfunding' could be useful in order to better achieve the goals of INVEST.

Crowdfunding is in principle a promising way for young and growth-oriented companies to close financing bottlenecks. Since crowdfunding in start-ups are typically made via special purpose vehicles and therefore represent an indirect form of financing, INVEST funding is currently not compatible with this form of financing. In addition, the minimum investment volume of €25,000 (until 1 March 2022 €10,000) required for INVEST funding does not correspond to classic crowdfunding, in which much smaller amounts are usually invested by individual investors.

Last but not least, the costly prospectus requirement, which applies if the publicly offered assets of a GmbH exceed €100,000, is an obstacle to larger collective investments in start-ups. The general development of crowdfunding is related to the regulations on prospectus requirements. However, to examine these in more detail in connection with INVEST funding is beyond the remit of this study.

The question of extending INVEST funding to indirect financing structures arises not only with regard to crowdfunding, but also with VC funds. Given that there is no underlying empirical evidence to suggest that direct forms of financing are more likely to close financing gaps for young companies than indirect forms of financing, it is not obvious at first glance why only direct investments, as in the case of business angels, should fundamentally benefit from INVEST funding. On the other hand, promoting funds or group investments would contradict the

idea of INVEST to reach private individuals who are also involved in the companies in a non-monetary way.

Furthermore, the INVEST grant is intended to provide an investment incentive by reducing the risk of an investment for an individual investor. In the case of fund investments, for example, this aspect plays less of a role, since the risk for each individual fund participant is low anyway due to the possibilities of diversified portfolios, or typically only small sums are invested by individuals. There would probably be less of an incentive effect from INVEST in crowdfunding due to the rather small individual risk than is the case with the traditional INVEST grant for business angels, so that higher free-rider effects are to be anticipated with INVEST funding for crowdfunding. Furthermore, qualitative research with participants in the VC market has shown that an INVEST-like support of private individuals in VC funds would lead to free-rider effects rather than to an actually higher mobilisation of venture capital¹².

The connection between crowdfunding and subsequent financing by business angels or VC companies or funds must also be critically evaluated. Upstream crowdfunding sends a negative signal to the financing decision of business angels and VCs, so that promoting crowdfunding could inhibit the development of investment volumes by other and downstream investors.

However, the crowdfunding market has shown itself to be adaptable to this criticism: crowdfunding platforms offer investors the opportunity to invest in companies both in the form of crowdfunding and individually as business angels. Offering this hybrid form of investment via the same platform could channel any undesired friction effects and ensure an efficient supply of capital for young companies. It is questionable, however, to what extent or whether any INVEST funding for many small investors (crowd) can be solved administratively on the part of BAFA.

In summary, there are rather more arguments against supporting crowdfunding under the INVEST programme than in favour of it and therefore the

¹² See "Feasibility and market potential study on INVEST-like support for private individuals in VC funds", Federal Ministry for Economic Affairs and Energy (BMWi), 2020.

expansion of the INVEST programme in favour of crowdfunding is not recommended.

4.10 Non-monetary measures

This evaluation study also aimed to investigate whether non-monetary measures should be implemented to increase the awareness and effectiveness of INVEST. Interview results indicate that the suggestions made for additional non-monetary measures of INVEST are mostly based on activities that are already widely carried out by networks such as BAND, promotional banks or start-up initiatives. A potential additional added value or complementarity through INVEST is not immediately obvious. The INVEST-registry of eligible companies on the BMWK website should be discontinued due to the lack of usage given the costs of running the registry.