Learning from Abroad?

Startup Accelerators and International Market Entry

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While internationalization efforts can substantially benefit startups to overcome financial and human capital input constraints, entering foreign markets remains a significant challenge. Accelerator programs are important in supporting startups scaling and growth ambitions by providing in-depth entrepreneurial learning opportunities. However, research on the effects of accelerators on startups' internationalization efforts remains scarce. This study provides novel evidence on the performance implications and workings of startup accelerators designed to support international market entry. To this end, we theorize on the potential learning mechanisms of accelerators and test our predictions by leveraging a unique empirical setting in which we study the German Accelerator (GA), a government-funded accelerator for startups that plan international market entries. Our data combines proprietary application data from the GA, detailed startup-level, founder, and investment information from Crunchbase and Revelio. The analysis reveals that startups raised significantly more funding from investors located in the GA target countries after participating in the program compared to the comparison group startups. Consistent with the learning mechanism, we also find that the main effects are muted for startups that participated in online programs offered by the GA in response to the COVID-19 pandemic, and the results are most pronounced for startups whose founders have ex-ante limited international experience. We confirm these findings with qualitative data from surveying GA alumni. Our study advances the understanding of the workings and limitations of startup accelerators designed to support internationalization efforts, a key strategy for many entrepreneurial ventures seeking for global scalability.

JEL Classification:

Keywords: Accelerator Program; Startup Performance; Entrepreneurial Learning; Entrepreneurial Finance; German Accelerator

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1 Introduction

International market entry has become a critical lever for young firms' scaling and growth (Lu and Beamish, 2001; Bruneel *et al.*, 2010; Jiang *et al.*, 2020). Internationalization efforts can help startups to overcome financial and human capital input constraints but also provide unique learning opportunities, especially if they are from regions with less developed entrepreneurial ecosystems (Oviatt and McDougall, 1995; Wormald *et al.*, 2021).[1] Despite the potential benefits of international expansion, entering foreign markets remains a significant challenge for startups: They must navigate cultural differences, adhere to unfamiliar legal frameworks, and compete for customers and talent in foreign markets (Zahra, 2005; Sapienza *et al.*, 2006). These obstacles are particularly challenging for startup founders, who typically lack reputation or local market knowledge and, thus, rely on external knowledge to manage internationalization efforts (Oviatt and McDougall, 2005; Naldi *et al.*, 2020). Hence, mitigating the challenges to internationalization attempts is of first-order importance as it facilitates entrepreneurial growth.

In this context, startup accelerators have become a prominent feature of the startup ecosystem to stimulate scaling efforts of new firms (see Hallen *et al.*, 2023). Accelerators offer entrepreneurship support programs that provide early-stage startups with intensive mentoring, education, and networking opportunities (Cohen *et al.*, 2019b). They can help startups refine their ideas, improve customer traction, develop an entrepreneurial mindset, and raise capital (Gonzalez-Uribe and Leatherbee, 2018; Hallen *et al.*, 2020; Yu, 2020; Hallen *et al.*, 2023; Assenova and Amit, 2024). While the literature on the effects of accelerators has been emerging, especially the role of accelerators in fostering the global scaling of startups remains underexplored. It is unclear whether and how programs designed for international expansion can effectively support internationalization efforts and for whom they are most beneficial.

In this study, we theorize and empirically test through which mechanisms participation in accelerator programs designed for international market entry can act as a catalyst for global expansion. From a conceptual perspective, accelerator programs may help startups access market-specific knowledge, reduce uncertainty, and build legitimacy in foreign markets through intensive mentoring, networking with domain experts, and credible endorsements. We argue that entrepreneurial learning opportunities are the most relevant benefits for program participants, eventually enhancing their chances to attract investors

[1] To illustrate, about one-third of European "unicorns" founded between 2008 and 2021 relocated their headquarters abroad, with the majority migrating to the US (European Commission, 2024). Similarly, according to the Financial Times (2024), Chinese ventures in the field of artificial intelligence are increasingly attempting to expand into the US market, seeking wider access to prospective customers, and investors.

and employees in the target market. Consistent with the learning mechanism, the main channel for these effects is social interactions with international peers, mentors, and investors that help entrepreneurs acquire market insights essential for navigating new business environments. Further, the benefits from participating in accelerator programs designed for international scaling should be most pronounced for startup founding teams with limited prior international exposure. The program's learning effects can help founders to overcome initial deficits in foreign markets, networks, and experience.

To test our theoretical predictions empirically, we exploit a unique, proprietary data source on all applicants of the German Accelerator (GA) program between 2012 and 2022. The GA is a government-supported accelerator designed to support startups' international scaling in major global innovation hubs–mainly the United States–by providing selected startups access to mentors and strategic partners who help them navigate the complexity of foreign market penetration. We augment the data on the 1,373 GA applicants with startup-level information, including detailed financial and investor information from Crunchbase and individual characteristics of startup founders from Revelio Labs, which comprises standardized and publicly available professional profiles of respective founders from online platforms, such as LinkedIn. To capture the effects of the GA program, we compare the financing activities of startups that successfully applied to the GA with two alternative comparison groups: startups that withdrew their application and applicants whose application was rejected. In particular, we differentiate startups' financing activities regarding the geographical location of investors to quantify startups' internationalization efforts in specific regions. As a last step, we also present responses from a follow-up survey with a small sample of GA alumni that back our quantitative analysis with qualitative insights. Taken together, this empirical setting provides a unique opportunity to gain a better understanding of how accelerators facilitate global expansion and enhance the performance of startups in international markets.

Our analysis shows that GA participants raised significantly more funding from the investors located in the GA target countries after the program than the comparison group startups. As an alternative measure of startup internationalization, our analysis also reveals that GA-participating startups hired more international employees while showing no significant change in employment for workers in Germany. We also find that the main effects are muted for startups that participated in online programs offered by the GA in response to the COVID-19 pandemic, highlighting the importance of social interactions as part of the unique learning opportunities. Further, the results are most pronounced for firms whose

founders did not have previous international professional experience. These results are consistent with our proposed learning mechanism.

In addition to the large-scale quantitative analysis, we also collect qualitative evidence from surveying alumni of the GA program. The insights from this online questionnaire confirm our empirical findings, emphasizing that the entrepreneurial learning experience from participating in the program helped startups expand their professional network in the target country. Moreover, the responses also highlight the practical relevance of the program for participating startups. Overall, the findings provide strong evidence for the relevance of accelerator programs in supporting the internationalization of startups. Therefore, our research provides novel insights into how accelerator programs impact startup performance, especially in the areas of financing and overseas workforce expansion.

Our analysis has important practical and academic contributions. To our knowledge, we are the first to examine whether accelerators can facilitate startups' international expansion. First, our findings have high practical relevance for both decision-makers and legislators. For entrepreneurs, time and money are limited resources and require careful allocation. Our results show that it is particularly worthwhile to participate in an accelerator program for those startups with limited ex-ante experience. Further, the benefits accrue within the participants' destination market but not on a domestic level. These findings suggest that startups need to carefully assess both their own skills and their growth strategy before deciding to join an accelerator program designed for international expansion. Likewise, from a governmental perspective, our analysis is insightful as it highlights the workings and limitations of a state-led accelerator program in supporting non-US startups entering the US market—a key strategy for many European and Asian startups aiming for global scalability. Selecting participants based on their actual needs is vital for effectively designing such programs. Overall, this study improves the understanding of the workings of startup accelerators designed to support internationalization efforts, a crucial element in the early stages of startups in a globalized world.

Thereby, we contribute and extend an emerging strand of the literature in strategy and entrepreneurship. While prior research on accelerators has demonstrated that participation can foster startup growth through metrics such as investment (Hallen *et al.*, 2023), survival (Yu, 2020), and customer tractions (Hallen *et al.*, 2020), our work extends this literature by investigating the role of accelerators in startup's internationalization. Moreover, our findings contribute to the literature on entrepreneurial learning (Poli-

tis, 2005; Nanda and Sørensen, 2010; Kacperczyk, 2013; Chatterji *et al.*, 2019) by showing that social interactions with mentors and peers in structured programs offer valuable learning opportunities for entrepreneurs to expand internationally. Additionally, our study contributes to the field of international entrepreneurship (McDougall and Oviatt, 2000; Zahra *et al.*, 2000; Oviatt and McDougall, 2005) by showing that accelerators can play a strategic role in enabling startups to acquire the knowledge and information necessary for international expansion while also expanding their networks—ultimately reducing costs and facilitating successful foreign market entry. In an international context, such as ours, Balachandran and Hernandez (2021) show that immigrant entrepreneurs can constitute a gateway to funnel foreign venture capital investment to startups located in sending countries. Our analysis examines accelerators as an important complementary channel through which startups can attract financing from foreign investors and gain traction abroad. Our study thus highlights how accelerators can support startups entering foreign markets and enriches both theoretical and practical discussions on startups' global expansion.

2 Background Literature and Hypotheses Development

2.1 The concept of accelerator programs

Since the early 2000s, the spread of startup accelerators has increasingly gained traction (Aljalahma and Slof, 2022). Prominent examples of firms that benefitted from participating in accelerator programs include Dropbox, SendGrid, and Airbnb (Cohen *et al.*, 2019b). The primary objective of accelerators is to provide entrepreneurial education (Cohen *et al.*, 2019b).[2] As an essential characteristic, they support cohorts of ventures in the earliest phases of their lifecycle predominantly through active mentorship in relatively short, fixed-term programs. More specifically, accelerators help startups to define and develop their business model: They assess the viability of the value proposition, identify promising customer segments, and secure critical resources, such as capital and talent (Cohen *et al.*, 2019b; Woolley and MacGregor, 2022). Accelerators might also provide non-monetary direct support, for example, in the form of office spaces. As part of the learning experience, startups typically gain access to the accelerator's

[2]In practice, the terms accelerator and incubator are often used interchangeably (Isabelle, 2013). The two models have some similarities and operate in overlapping spaces with entrepreneurs, but they follow two opposite objectives. Unlike accelerators, incubators are primarily thought to host entrepreneurs, e.g., providing co-working space and shared office resources in exchange for rental payments. Incubators are less selective in admission than accelerators, and they offer, if at all, ad-hoc educational offerings and mentoring (Cohen *et al.*, 2019b). In terms of more general objectives, incubators are established to foster overall economic growth (Yusubova *et al.*, 2019), while the focus of accelerators lies on fostering growth and return of specific ventures (Isabelle, 2013).

network, including important stakeholders, such as successful entrepreneurs, program graduates, business angels, venture capitalists, and corporate executives.

Aside from these common elements, different accelerator programs can have very specific designs (see Pauwels *et al.*, 2016; Cohen *et al.*, 2019b; Assenova and Amit, 2024). Some programs are affiliated with private corporations, whereas others are affiliated with investors or have a public background, such as universities or governmental agencies (Cohen, 2013). Most accelerators are free of charge, but others may take a small equity share of the participating venture if financial support is provided, usually not exceeding 0.5 million Euros (Yusubova and Clarysse, 2016; Cohen *et al.*, 2019b). Different programs may also target specific groups of startups, business fields, or distinct startup activities. For example, certain accelerators are specifically designed to support startups aiming for international expansion. These programs often provide tailored mentorship, connections to foreign investors and partners, and market-specific insights to help startups successfully enter and operate in global markets.

2.2 How accelerator programs support entrepreneurs

With a globally increased interest and activity of accelerator programs, research on the effects of accelerators on participating startups' performance has been emerging (Gonzalez-Uribe and Leatherbee, 2018; Cohen *et al.*, 2019b,a; Hallen *et al.*, 2020; Yu, 2020; Hallen *et al.*, 2023). Results from previous research vary due to differences in samples and methodologies but also because of the large differences in accelerator designs as described above (Assenova and Amit, 2024). Findings suggest that not all accelerators positively impact participating startups' performance. However, a key implication is that programs with an overall positive effect on entrepreneurial activity achieve this mainly through two explicit non-financial channels: learning and signaling.[3]

Learning opportunities offered by accelerators include interactions with peer entrepreneurs and businesses, such as intensive mentoring and workshops led by experienced experts (Gonzalez-Uribe and Leatherbee, 2018; Cohen *et al.*, 2019b,a; Hallen *et al.*, 2020; Yu, 2020). The learning mechanism thus suggests that founders can gain knowledge, methodological skills, and operational insights relevant to their current business activities and the implementation of their business plans (Woolley and MacGregor, 2022). Moreover, these gains can lead to timely pivots or, in some cases, the decision to shut down, thereby saving resources in the long-term (Yu, 2020). For example, the feedback founders receive during

[3]See Hallen *et al.* (2023) for an excellent overview.

the accelerator program can push entrepreneurs to refine their ideas more quickly and address uncertainties about their feasibility more efficiently. Eventually, these valuable learning opportunities can help startups improve their financing activities and scale their operations (Hallen *et al.*, 2020).

Apart from learning, signaling is another channel through which accelerator programs can benefit participating startups (Hallen *et al.*, 2020, 2023). In essence, signaling refers to the notion that accelerators can credibly project the value of a high-quality venture to external stakeholders as they are neutral evaluators of applicants to their program. The signaling mechanism posits that admission to an accelerator program can function as a credible indicator of startup quality to third parties, such as investors. Thereby, the strength and credibility of the signal is contingent on the quality of the signal provider (see Connelly *et al.*, 2011), i.e., the accelerator. For example, Hallen *et al.* (2023) provide evidence on the signaling effect of accelerators by showing that participation in prestigious accelerator programs moderates the positive impact of prior employer and university reputation for attracting high-profile investors.

Overall, an emerging body of research provides valuable insights into the performance implications of accelerator programs and the underlying theoretical mechanisms of learning and signaling. However, it remains unexplored whether accelerators designed for specific purposes effectively support startups. In particular, it is unclear whether accelerators' support that aims to facilitate international market entry can effectively do so. The theoretical mechanisms of learning and signaling are likely relevant dimensions for startups' internationalization and global scaling efforts. For successful foreign market entry, startups must overcome cultural, legal, and normative differences. Gaining a better understanding of how accelerators can achieve this is crucial, as international expansion is often a key growth strategy for startups seeking long-term success in a competitive global market. To the best of our knowledge, we are the first to examine the performance implications of accelerator programs designed to support startup internationalization.

2.3 Hypotheses Development

This section theorizes on how accelerators can affect the international market entry of startups, with a particular focus on attracting financing from foreign investors.[4] We build on the mechanisms outlined above to advance the theoretical framework along these dimensions. We posit that accelerator programs

[4] In supplementary empirical analysis, we further consider the expansion of a foreign workforce as an alternative measure for startups' international scaling.

designed for international market entry can help startups obtain financing from foreign investors.

Tailored learning activities are a key channel through which accelerator programs with an internationalization focus can strengthen startups' global scaling capabilities. Conceptually, such designated programs can offer targeted guidance to improve specific internal capabilities necessary for entrepreneurs to accomplish the international scaling of their venture. More specifically, regular cohort interactions and networking opportunities with local insiders can create important formal and informal ties. For example, the evaluation of startup founding teams is one of the most important criteria in the decision-making process of investors (Hochberg *et al.*, 2007; Gompers *et al.*, 2020). Hence, as one part of startup accelerator programs, direct interaction with potential investors is a highly relevant aspect of attracting financing. Equally important, intensive interactions with mentors and domain experts may reduce uncertainty about a startup's feasibility in foreign markets by guiding the adaptation of their offerings, marketing strategies, and value propositions to align with the cultural and institutional nuances of new regions. By acquiring knowledge and gathering feedback through these interactions, startups can develop a deeper understanding of foreign markets, refine their products to meet local demands, and strategically prepare for market entry. Eventually, these learning effects should further raise startups' attractiveness to acquire external financing, e.g., from venture capitalists in the target market.

Importantly, gaining a deeper understanding of cultural, legal, and normative specificities in the target market raises distinct human capital that is necessary for startups to scale globally. Therefore, we consider the acquired learning capabilities to strategically prepare for market entry (i.e., local knowledge) as specialized resources. Such local knowledge from foreign mentors and peer companies may not be particularly conducive to raising startups' attractiveness towards investors in the home market. Instead, we posit that this knowledge is relevant to enhancing startups' attractiveness to foreign investors.

Participating in an accelerator program may also serve startups as a positive signal conducive to attracting investments. On the one hand, the visible endorsement by the accelerator shows potential foreign investors that participating startups have already met certain capability standards (Cohen *et al.*, 2019b). At the same time, the signaling value of a foreign accelerator program from an investor's perspective may be weak in an international context, such as ours, in which investors likely face challenges in assessing a startup's potential to succeed in a foreign market.[5] Further, the signaling value is not

[5] This aspect is crucial since information asymmetries are known to induce investors to predominantly source investments from local networks within tight geographic bounds (Balachandran and Hernandez, 2021).

determined by the startups' capabilities but by the accelerator's reputation from the perspective of potential investors. As such, unlike the learning opportunities, signaling is not tied to the context of the program, which we consider a generic capability. Given that the reputation of the accelerator is strong enough, generic resources should be relevant for raising startups' attractiveness to investors from both the home and the target market.

These considerations suggest that participation in accelerators designed for international market entry should serve as a gateway for startups seeking investment from international investors. This leads us to the following hypothesis:

Hypothesis 1: *Startups that participated in accelerator programs for international market entry will attract more financing from foreign investors than comparable startups that did not participate in it.*

The previous considerations are agnostic about the relevance of learning and signaling mechanisms. A key difference between the two channels is that learning implies internal improvements within the startup based on interactions with external stakeholders while signaling leverages external perceptions about the accelerator to benefit the startup (Venâncio and Jorge, 2022). These differences are likely relevant in triggering heterogeneous effects concealed by the average treatment effects.

Social interaction with peers is essential for entrepreneurial learning (Nanda and Sørensen, 2010; Kacperczyk, 2013). Consistently, a key element of the learning mechanism is the engagement with international peers, mentors, and investors. In particular, face-to-face interactions with these insiders from the target market should be vital for developing a better understanding of relevant institutional economic features. It will help entrepreneurs gain diverse perspectives and market insights essential for navigating new business environments. Thus, we argue that the extent to which the design of accelerator programs allows for interactions will shape their actual learning imprint.

Unlike the learning mechanism, the signaling value is less dependent on the specific program design, i.e., the format and content of learning provided and the social interactions as part of an accelerator program.[6] Instead, it is rather determined by the perceived quality of the accelerator, as discussed above. Therefore, if learning is the key theoretical mechanism behind the positive effect of accelerator participation on financing from foreign investors, then modifying the program structure by reducing interactions with international peers and mentors would weaken this benefit. More generally, changes

[6] We acknowledge that the accelerator program content can also be important for the signaling value. However, changes in the specific program design should only affect the accelerator's reputation over the long run, and, in particular, it should be relatively sticky across different types of programs offered by one single accelerator.

in the program design and the learning content should only change the effects of participating in an accelerator program once learning mechanisms are at play. Against this background, we formulate the following hypothesis consistent with the learning mechanism:

Hypothesis 2: *The positive association between participating in accelerator programs for international market entry and startup financing from foreign investors will be reduced in programs with limited social interaction.*

Moreover, we consider that the benefits of participating in an accelerator program vary across different founder teams. In startups, the ability to integrate the capabilities offered by accelerator programs strongly depends on their founders' characteristics (e.g., Storz *et al.*, 2024). For example, the operational processes are typically concentrated on the founding team members, especially during the early phases of a startup. Prior work experience and education endow founders with operational expertise, which are important for startup success (Colombo and Grilli, 2005; Hsu, 2007).

In the context of internationalization, entrepreneurs with prior experience in the target market have already obtained insights into the cultural and institutional nuances of the respective region. They may have even already established network ties. In contrast, entrepreneurs without international experience often face significant challenges in bridging knowledge gaps, navigating cultural differences, and building networks abroad (Bloodgood *et al.*, 1996; Bruneel *et al.*, 2010). In these cases, the learning opportunities provided by accelerators, including specific knowledge and access to critical resources, can be particularly valuable in overcoming these barriers.

Conversely, prior international experience should moderate the benefits from participation if participating in an accelerator program primarily benefits startups by offering valuable learning experiences. Hence, the benefits of accelerators designed to foster global scaling startups should be contingent on the international experience of the founding team. Based on these considerations, we argue that entrepreneurial education and prior experience work as substitutes, such that accelerator participation has a stronger positive effect on attracting foreign investors for ventures led by less internationally experienced founders. Formally, we posit:

Hypothesis 3: *The positive association between participating in accelerator programs for international market entry and startup financing from foreign investors will be larger for startups whose founders have limited prior international experience.*

3 Empirical setting: The German Accelerator Program

The GA was established in 2011 with the distinct objective of empowering German startups to scale globally. It supports startups without focusing on specific segments or business fields and does not take equity share, arguably leading to more independent advice. The German Federal Ministry for Economic Affairs and Climate Action (BMWK) fully finances the GA, but it does not take any equity or options from its participants. Instead, it sees the promotion of startups as a direct investment in innovation, new jobs, and economic growth (BMWK, 2022).

Aligned with its mandate, the GA intends to accelerate the go-to-market strategy. Specifically, it offers selected high-potential ventures a learning journey to understand, discover, and access the innovation hubs in the United States and Asia. These journeys comprise customized mentoring activities and grant access to an extensive network of business partners and investors.

Eligible applicants for any GA program must fulfill three basic requirements. First, they must be incorporated in Germany as UG, AG, GmbH, or GmbH & Co. KG (equivalent to limited liability and listed companies). Second, they must qualify as a small and medium-sized enterprise based on the European Union (EU) definition, which includes firms with less than 250 employees and a turnover of annually less than 50 million Euro or a balance sheet total not exceeding 43 million Euros. Third, they must not exceed the limit of the official EU De-minimis aid regulation. All applicants who meet these three requirements can generally be considered in a selection process.

To eventually participate in any GA program, startups must pass a structured process. The GA seeks to recruit startups ready to expand to new markets. The evaluation considers five main categories: team, product and commercial opportunity, financials, operations, and GA fit. The team score is based on the team composition, willingness to learn, acceptance of feedback, and engagement regarding the expansion and the program. The product and commercial opportunity get evaluated based on technology, customer demand, value proposition, intellectual property, competitive landscape, value creation curve, and partnering opportunities. For the financials score, the cash in the bank, the cash burn rate, the runway, and the already received funding are considered. The operations are scored based on the operative structure of the venture regarding the expansion. Lastly, the GA fit is based on the chances and opportunities of the venture in the target market, the fit between the venture and the accelerator, as well as on the impact the GA can generate.

Based on these criteria, applicants get sorted into two buckets: review or screen. Borderline applicants are sorted into the *screen* bucket and must undergo additional screening by a sub-committee. If they pass the extra screening, they can pitch their venture; otherwise, they get rejected. Applicants of the *review* bucket are invited to pitch their venture without the additional screening by the sub-committee. Each pitch gets evaluated by the selection committee, which consists of at least one external member. Once all companies have pitched their business to the external selection committee, the committee decides which applicants are accepted to participate in the program and which are rejected. Between 2011 and 2022, the rejection rate of startups participating in any of the three-month GA programs was 52%.

The GA invites selected startups to participate in a three-month program in the respective innovation hub in the United States of America or Asia. During the program, participants receive free office space and work in one-on-one mentoring sessions on validating their product-market fit and developing a solid go-to-market strategy. In addition, they receive support in setting and achieving milestones, defining a financial plan for their expansion, and optimizing the marketing and sales approach. Furthermore, through on-site contact with potential local business partners and customers, participants can understand the local business mentality and cultural differences in customer needs and behaviors. The program is free of charge, but the participating entrepreneurs must cover associated expenses unrelated to the accelerator, such as travel and accommodation.

Our analysis considers all GA programs that offer a medium-term stay in a dedicated target market (see Table IA1, Appendix, for an overview). Between its initial launch in 2011 and 2022, GA has supported about 1,200 startups in any of the three-month programs. Overall, these startups have raised about 16 billion USD in funding and employ approximately 6,000 people. Among the best-known alumni are the five German unicorns Celonis, N26, FlixMobility, Forto, and Staffbase.

4 Data, descriptives, and methods

4.1 Data sources, sample description

Our empirical analysis leverages a unique dataset that integrates several main components. The data combines proprietary information about GA applicants obtained from the German Accelerator with startup characteristics, funding information from Crunchbase, and founder-level characteristics obtained from Revelio Labs. In supplementary analyses, we complement the quantitative examination with quali-

tative survey data (for details, see Section 5.3). In the following, we describe the data generation process of our main empirical analysis.

The GA application data resembles the basis for our sample. The application data contains proprietary information on all startups that applied for any of the GA programs between 2012 and August 2022. Most importantly, the data contains information on the startup names, the application date, the program, the status (i.e., participated, rejected, withdrawn), and the participation cycle (i.e., each year consists of four cycles). We observe 1,373 applicants, out of which 587 eventually get accepted, 660 are rejected, and 126 withdraw their application, resembling an acceptance rate of 42%. Compared to prestigious startup accelerators like Techstars and Y Combinator or longer-termed public programs, this rate is relatively high (see Forbes, 2017). Still, it aligns with other medium-term governmental or university accelerator programs that are more comparable to the GA programs. All startups in our sample applied for the GA program. This way, we can avoid selection issues arising from differences across firms that seek support from startup accelerator programs.

Next, we add financial and other startup-level data from Crunchbase. The data is mainly important as it contains information on external funding rounds, including deal sizes and corresponding investor data, which we use to generate our main dependent variables. We manually search for each GA applicant in the Crunchbase database. We verify ambiguous or double names using information that is contained in Crunchbase as well as in the GA data, such as homepage URLs or location information. We further conduct a consistency check by comparing the cycle year with the year of incorporation and remove any implausible observations.[7]. This procedure leaves us with a sample of 898 individual startups from Germany. Intuitively, we retrieve proportionally more accepted and withdrawn startups compared to their shares in the raw data from the GA: 52% applicants in the linked sample are accepted to the GA program, 12% withdraw, and 36% are rejected.

In addition to this, we add details on startup employees and the founding team using data from Revelio labs. This data comprises publicly available professional profiles of entrepreneurs. Revelio collects, aggregates, and standardizes all publicly available professional profiles, job postings, and employee sentiment reviews from online platforms, such as LinkedIn, to create a universal human resource database, including individual employee histories. As an important element for our analysis, we can retrieve the

[7]Specifically, we remove any startup founded before 1999. This approach is consistent with other studies on entrepreneurial financing, which exclude observations with too large time gaps between the year of incorporation and the initial funding round (e.g., Townsend, 2015).

international work experience of founders and employees. We aggregate the employee and founder information on the startup level and map it to the GA application and Crunchbase dataset. Crunchbase and Revelio data contain URLs from startups' homepages and LinkedIn profiles, allowing us to link the information without a matching algorithm. In total, we retrieve Revelio data for 813 out of the 898 sample startups. Table IA2 (Appendix) contains the complete variable list on our final sample. We organize the data in a cross section but keep information on pre- and post GA program participation.

4.2 Descriptive statistics

Our final sample covers 873 German startups that participated in a GA program between 2012 and 2022. Table IA3 (Appendix) displays descriptive statistics on the main characteristics of the sample firms. When participating in the GA program, startups are, on average, 3.7 years old, and the founding team consists of 2.8 entrepreneurs. Sample startups receive two funding rounds with a total funding volume of seven million USD, on average. About 41.4% of firms receive funding from the US, a prime target market of GA participants.

Regarding geographical distribution, about half of the startups are headquartered in Berlin (27%) or the state of Bavaria (22%). Other clusters are the population-rich states of North Rhine-Westphalia (13%) and Baden-Wuerttemberg (9%). Only 8% of startups are domiciled in the East German states, and the remaining sample startups are dispersed across Germany. These distributions are very similar for successful and rejected applicants. For a subsample of 533 startups, we know their NAICS industry classification. Expectedly, the sample startups are concentrated on three business fields, namely information technology (54%), manufacturing (19%), and professional, scientific, and technical services (15%). These distributions are close to identical when distinguishing accepted and non-successful GA applicants (see Panel C of Table IA3, Appendix).

Previous statistics mark a static description of the sample. In the following, we assess statistics on the financial and hiring activities of startups, comparing pre and post-GA program timeframes in Table 1. These statistics reveal several important patterns. First, they show that the total funding volume increases comparing pre and post-GA periods, with 4.6 and 5.5 million USD of funding, respectively. Combined with an average slightly lower frequency of external funding rounds after the GA program than before (0.537 versus 0.471), these statistics reflect the staging of VC investments, with fewer startups

raising larger rounds at later stages. Second, these patterns apply when considering funding rounds with German investors, but not when considering funding rounds with foreign (i.e., non-German) investors. Third, the above-described patterns are much more pronounced when only considering startups that participated in the GA program than those that did not participate. For example, the average funding amount from German investors increased by about 0.680 million USD comparing pre- and post-GA periods, while this increase is more pronounced for investments from foreign investors (plus 1.364 million USD) despite much lower base levels. Notably, this increase in investments from foreign investors is particularly pronounced for GA participants (plus 2.008 million USD). Fourth, we find very similar patterns when considering the hiring activities of employees in Germany and abroad, i.e., the target market of the majority of GA programs. Overall, these descriptive statistics suggest a positive effect of the GA program on startups' funding and hiring activities in international markets, consistent with the hypotheses on the stimulating effects of accelerator programs on the international scaling of startups. In the following, we test this relation in our empirical analysis.

- Insert Table 1 here -

4.3 Main variables

4.3.1 Dependent variables

Our focal dependent variable is the accumulated deal volumes of startups before and after the GA program. As a key element of the analyses on startups' internationalization efforts, we distinguish deals depending on the location of the investors. Specifically, we consider the funding volumes ($Deal_{vol}$) in log US-dollars made from investors located i) in Germany (*Domestic*), ii) outside of Germany (*Abroad*), and iii) in the United States ($Abroad^{US}$), respectively. In the case of syndicated deals, location is defined as at least *one* investor being from respective locations. We use alternative classifications in robustness tests. As alternative measures, we also consider the number of deals or the number of employee hirings of sample startups.

4.3.2 GA participation

Our empirical analyses focus on all startups that applied for the GA program between 2012 and 2022. We capture the effect of participating in any of the GA programs by comparing participants' financing

activities before and after the program with the before-after of other startups that applied for the GA program but did not participate.Observing the post-GA period is impossible for non-participating startups. However, from the GA application data, we know at what time each startup would have participated in the program if it had been accepted. We use the corresponding program end as the reference time.

The GA does not provide grade scores of participants' applications, such that we cannot make comparisons of "almost accepted" and accepted startups (e.g., as in Hallen *et al.*, 2023). Hence, our estimation strategy compares startups that eventually participated in the GA program with startups that did not participate in the GA program despite being accepted (i.e., withdrawn startups). The comparison of accepted versus withdrawn startups could be problematic if startups are systematically different across groups. To mitigate concerns that observable differences confound or estimations, Table 2 displays summary statistics on startup characteristics before their GA program application, comparing accepted, withdrawn, and rejected applicants. Notably, GA participants do not significantly differ from startups that withdraw their applications regarding key observable characteristics. Specifically, participating and withdrawing startups are similar in terms of age, founder team size and experience, and pre-GA funding and hiring activities. While these statistics do not remove the concern of not having clean comparison groups, they should considerably lower concerns about the comparability of the groups.

- Insert Table 2 here -

Our estimations include two dummy variables that mark the respective subgroups. The indicator *Participated* is equal to one for startups that successfully applied for and participated in the GA program and zero otherwise. *Rejected* is a dummy equal to one for startups that applied for the GA but were rejected and, therefore, did not participate in the GA program. Hence, the reference group in this setting is *Withdrawn* startups, which were initially accepted to the program but did not participate.

4.4 Baseline model specification

We investigate the impact of the German Accelerator Program by assessing startup performance before and after participating in the program, testing Hypotheses 1-3. Formally, we estimate:

$$Y_{ijfs}^{\tau} = \beta_1 Participated_i + \beta_2 Rejected_i + \beta X_i + \psi_j + \phi_f + \alpha_s + \varepsilon_{ijfs}^{\tau} \quad , \tag{1}$$

with, the dependent variables, Y^{τ}_{ijfs}, representing startup performance as defined before of startup i that applied for the GA program in cycle year j, founded in year f, and is active in the business sector s. Period $\tau \in$ [pre, post], refers to either before or after the GA program and is denoted as *pre* or *post*, respectively. As an important component, Equation 1 controls for GA-cycle year fixed effects (ψ_j). This is crucial since startups that applied for more recent GA cycles had less time to raise external investments than those applying during the early years of the GA. Further, we control for confounding effects arising from firm age- and industry-specific effects by including startup founding year fixed effects (ϕ_f) and sector fixed effects (α_s). We also add a vector X of startup-level control variables, such as founders' working experience, prior founding experience, and the size of the founding team, all of which have been shown to affect startup performance (e.g., Dencker and Gruber, 2015; Jin *et al.*, 2017). Standard errors are clustered on the startup level, with ε representing the error term.

5 Empirical results

5.1 The main effects of the GA program

5.1.1 External financing from foreign investors

We start by analyzing whether the GA program has a positive effect on startup funding, in particular, regarding investors domiciled in the program's target market in line with Hypothesis 1. To do so, we separately estimate Equation 1 for pre- and post-GA participation periods. Table 3 displays the results of this first estimation. As a key insight, GA participants raise significantly more funding from international investors than domestic investors after the program relative to startups that applied for the program but did not participate. The positive and statistically significant coefficients in Columns I and II on the *Participant*-dummy (1.789 and 2.016) suggest a substantially higher funding amount received from US or non-European investors relative to the baseline (i.e., withdrawn), confirming Hypothesis 1. This difference is also economically significant in size, implying a 1.7 to 2.0 times higher funding volume from respective investors.[8] Rejected applicants receive relatively less funding from any source, as indicated by the negative coefficients on the *Rejected* dummy. However, this difference is statistically insignificant.

[8] Table IA4 (Appendix) shows that the magnitude of the estimated effects differs irrespective of differences in the mean dependent variables across subsamples by using z-standardized dependent variables. Further, the results qualitatively do not change when excluding startups participating in the Discovery Programs or when only considering the Market Access Programs (not displayed).

- Insert Table 3 here -

Importantly, these effects do not hold for funding obtained from domestic investors and for funding received before the GA program (Columns III-VI). The insignificant coefficients suggest that participating and withdrawing startups are comparable before the GA program, conditional on time-, industry-, and startup-related factors. Table IA5 (Appendix) shows that these effects are robust to using the number of deals as an alternative dependent variable (Panel A), using alternative model specifications (Panel B), and when determining the location of the investor solely by the lead investor (Panel C).

A series of additional tests emphasize the robustness of these findings. As such, one argument could be that the results are related to time-specific factors that are not captured by the GA cycle fixed effects. To test this, we first condition that the financing activities occurred within the four years after the GA program. This way, we impose a rather symmetrical time window for all startups irrespective of the cycle period they participated in. As an alternative approach, we also leave out the latest two cohorts, i.e., the cycle years 2021 and 2022. Panel A of Table IA6 (Appendix) contains the corresponding results, indicating that the main results are not sensitive to these adjustments. Similarly, to mitigate concerns that rejected and accepted cohorts are too similar to compare, we repeat the estimations without the rejected startups and find qualitatively similar results (see Panel B of Table IA6, Appendix).

5.1.2 Internationalization of the workforce

While the previous analyses focus on VC financing dynamics as a measure of internationalization, we also consider startups' hiring activities. Indeed, international hiring reflects a key facet of moving internationally. Compared to VC financing activities, hiring efforts should be a longer-term outcome of a startup's internationalization process. To study the effect of the GA program on startup hiring activities, we estimate Equation 1 using startups the number of newly hired employees before and after the GA program as the dependent variable. Revelio data allows us to capture the hiring activities of startups as well as the location of respective employees' workplaces.

To examine whether the GA program helps startups to scale globally regarding hiring activities, we reestimate the baseline specification using new employees as the outcome variable. Similar to before, we distinguish between foreign and domestic hires. Figure 1 displays the corresponding regression results graphically. It plots the coefficients of the *Participated* dummy from Equation 1. The dependent variable

is the z-standardized logarithm of new employees. The plots show that GA participants hire significantly more employees after participating in the program than startups that withdraw their applications. This effect applies to foreign hires, especially from the US (Panels A and B), but not to domestic ones (Panel C). Consistently, we find that GA participants increase their international workforce relative to other applicants who do not participate in the program (Panel D). For example, while there is no statistically significant difference in the share of foreign employees comparing GA participants with withdrawing applicants, GA participants have a statistically significant 5.1% higher share of foreign employees after the program. Economically, this effect is sizable, implying an increase in the international workforce of about 50% (with a mean pre-GA share of foreign employees of 10.4%). Table IA7 (Appendix) presents the corresponding regression output for z-standardized and the original hiring count.

- Insert Figure 1 here -

We conduct several robustness tests that confirm the validity of these results. To do so, we apply an equivalent set of tests consistent with those in Tables IA5 and IA6 (Appendix) of Section 5.1.1. The previous hiring-related results are robust to using alternative dependent variables, changing the set of controls, and excluding rejected GA applicants from the sample (undisplayed). Further, the results concerning startup hirings are primarily driven by startups participating in the GA programs not later than 2019 (see Panel C of Table IA7, Appendix). This finding suggests that hiring activities are longer-term outcomes associated with participating in the GA program. Overall, these results show that the GA program helps startups scale globally, using employee counts as an indicator for internationalization.

5.2 The role of learning through personal interaction

Next, we leverage a specific feature in our empirical setting to test Hypothesis 2. Specifically, we examine the role of learning through direct interactions of individuals. To do so, we exploit the impact of the COVID-19 pandemic on the GA program as a quasi-natural experiment. As of Q2 2020, international travel restrictions strongly affected the GA, likely mitigating the positive learning effects. The GA temporarily switched its programs to an online format. Moreover, in response to the pandemic, the GA decided to launch the *Academy*, a virtual training program that only involved a one-week trip to the startups' target market. These adjustments in the GA program can be considered as a random exogenous shift in the effectiveness of the accelerator's on-site mentoring programs. We flag all applicants for virtual

GA programs to test the differential effects across program types.

Confirming Hypothesis 2, we find that virtual programs moderate the positive effect of the GA in increasing investments from target country investors. As displayed in Table 4, we observe a positive, large, and statistically significantly higher post-GA funding volume for startups that participated in on-site programs (Columns I-III), whereas the results are small and insignificant for participants of online programs (Columns IV-VI). Interestingly, when we control for this factor, we even find a small and positive effect in funding received from domestic investors that is significant at the ten percent level, emphasizing the overall positive impact of accelerator programs on startup financing. The results are robust to using an interaction term specification in the full sample, and we find similar results when examining the internationalization of the workforce (Table IA8, Appendix).

- Insert Table 4 here -

Overall, these results show that the beneficial effects of the GA program are driven by startups that benefit from gaining on-site experience in an international context. These findings corroborate the view that accelerators can provide valuable resources to startups' human capital, allowing them to scale globally. The findings highlight the importance of social interactions as a central component of the learning mechanism. They suggest that the learning opportunities offered by foreign mentors raise human capital, which is necessary for startups to foster entrepreneurial scaling capabilities and, eventually, to enter international markets.

5.3 Who benefits from international accelerators?

In the following, we combine the previous insights to examine which types of startups benefit most from participating in an accelerator program designed to foster internationalization. To this end, we re-estimate the baseline specification but distinguish startups regarding their level of internationalization before participating in the GA program. Consistent with Hypothesis 3, the intuition behind this is that the learning and signaling mechanisms should have differential effects depending on the founding teams' ex-ante international experience. With lower internationalization, startups may benefit from participating in the GA program by learning from their foreign mentors. Conversely, with higher ex-ante internationalization, startups may not benefit from their experience abroad but rather from the program as a positive signal in the domestic market.

To elicit the role of learning and signaling behind our main results, we use different measures for startups' ex-ante degree of internationalization. As a strong indicator of prior internationalization, we consider whether parts of the workforce are active outside of Germany. The assumption is that startups must have some form of business activity in their respective countries once they employ workers abroad. Against this background, we investigate whether GA applicants with and without an international workforce before the start of the program respond differently to participating in the program.

We separately estimate the baseline regression from Table 3 for the two subsamples. Figure 2 displays the results graphically by plotting the coefficient on the *Participated* dummy. The graph shows two important patterns. First, Panel A shows that the baseline effects apply to startups without employees abroad: Firms that did not internationalize before the program obtain relatively more funding after the program from foreign investors than the comparison group, whereas there is no difference in the financing before. Moreover, no such differences between participating and withdrawing startups prevail for investments from domestic investors. This effect is consistent with the overall learning effect and Hypothesis 3.

- Insert Figure 2 here -

Second, these results substantially differ when considering startups with at least one employee outside of Germany (see Panel B of Figure 2). We still observe a positive effect on funding from foreign investors for these internationalized startups. This association is much weaker compared to startups with low ex-ante internationalization. Hence, this effect is consistent with the idea that prior international experience moderates the learning effect that leads to a relative increase in funding from foreign investors after the GA program. More importantly, we find that financing by domestic investors is significantly higher for GA participants than for withdrawing startups after the GA program. Again, this applies to startups with relatively high ex-ante internationalization. It corroborates the idea that such firms benefit from participating in the GA program from a signaling effect. Given that the GA program primarily hosts German startups, it is intuitive that the positive signaling effects mostly affect investors from Germany. Table IA9 (Appendix) contains the corresponding regression output (Panel A).

We also consider alternative indicators for startups' degree of internationalization to detail the previous findings. Specifically, we examine the work experience of the founding team gathered outside of Germany before participating in the GA program. We repeat the previous estimations, distinguishing

startups whose founders have international work experience from those without. Panel B of Table IA9 displays the results, which are qualitatively similar but weaker than before. The observation is in line with the idea that work experience in an international context is, arguably, a weaker indicator of internationalization than having an international workforce, especially in the startup context. Panel C shows that the observed patterns from Panels A and B also apply when considering investments specifically from US investors.

To demonstrate that the mechanism is related to startup internationalization, we conduct a placebo-like robustness test. A central argument in this subsection is that *international* experience is an explanatory factor that allows us to elicit the learning effects. If this is the case, work experience generally should not yield comparable results. To test this assumption, we split the sample considering startups whose founders are above or below the median work experience of sample startups. We measure the average employment years of the founder team. The corresponding results in Panel D of Table IA9 confirm that the baseline effects apply irrespective of the average work experience of the founder team.

5.4 Qualitative evidence: survey responses

The previous results consistently show that the beneficial effects of the GA program are contingent on startups' ex-ante level of internationalization. The central assumption of our empirical strategy is that entrepreneurs are responsive to the treatment, implying that the GA program improves startups' relations with investors and access to skilled labor *particularly outside of Germany*. Such relations are only imperfectly measurable using observational data. To mitigate concerns regarding the plausibility of our underlying assumption, we contacted GA alumni using a questionnaire (see Appendix B).

In this survey, we collected basic information about each respondent's GA cohort and focused our questions on whether and how GA participation facilitated entry into the target market. Specifically, we asked whether GA helped expand professional networks or connect with customers in that market and which aspects of the GA program—such as professional networks or educational components—had an influence. Respondents answered these questions on both a yes/no basis and a six-point scale ranging from strongly disagree to strongly agree. In total, we were able to retrieve structured responses from 27 former GA participants.[9] Figure IA1 (Appendix) displays descriptive characteristics on the survey

[9] This small number mirrors that startup founders are likely very time-constrained, and many of the startups participated in the GA program several years before we contacted them for the survey. Consistently, other studies that conduct surveys in the startup ecosystem expressed similar problems. For example, Bernstein *et al.* (2016) state that surveys in the VC

respondents. Importantly, we observe that most participants had fairly limited international experience before participating in the GA program. For example, most respondents (81.5%) state that they did not receive funding from investors in the target market before they participated in the GA program (Panel B of Figure IA1, Appendix). Similarly, most participants (77.8%) also reported on a 1-6 scale that they had little (i.e., 3 or lower) professional experience before their participation in the program (Panel C).

The insights gained from our qualitative assessment of the GA program underscore our previous empirical results along several dimensions. An overwhelming majority of participants agreed with the statement that the professional network and the educational programs offered by the GA helped them to access their respective target markets. Figure 3 details on these responses. These results are consistent with our main findings, emphasizing the benefits of participating in the GA program, especially since most startups lack international experience ex-ante.

- Insert Figure 3 here -

Building on these findings, the survey responses also highlight that the benefits of participation in the accelerator program are mainly attributed to improving startups' international exposure. To show this, Figure 4 graphically illustrates survey responses, differentiating between benefits accrued in the domestic context and those in the target country of their GA program. Panel A displays the fraction of respondents that indicated whether they agree with the statement that participating in the GA program helped connect with customers, i.e., in Germany or in the target country where the GA took place. About 44.4% of respondents agree or strongly agree that their GA participation was conducive to connecting with customers in the country of their GA participation. With 14.8%, this number is much lower when asked about establishing connections with German customers. This pattern is consistent when disregarding respondents who only slightly agreed with these statements. Moreover, we obtained similar responses when asking GA alumni about benefits more generally. Panel B of Figure 4 displays responses on the question whether participating in the GA program helped startups establish a professional network, both in Germany and in the country where the GA program took place. About 51.8% agreed or strongly agreed to this statement when considering the professional network in the target country. Again, these numbers are much lower concerning the professional network within Germany.[10]

industry are difficult because market participants "*are both time constrained and notoriously reluctant to provide data on their operations*".

[10] We also assess these responses in light of the COVID-19 related online programs. About 37% of survey respondents participated in GA programs affected by the pandemic (see Figure IA1, Appendix). Despite the small sample size, we find

Overall, these insights are participarly important since most respondents from the survey stated that they had limited experience with their target market before participating at the GA.

- Insert Figure 4 here -

Finally, we also provided alumni the chance to comment on their overall experience in an open-ended question (see Question 8 in Appendix B). The responses underscored the benefits of learning from local mentors and market experts – for instance, one founder noted that GA offered "personal insights on how cultural norms and thinking differ in the US versus Germany" and that the "general education lessons were particularly helpful" for navigating this unfamiliar environment. Another founder noted that GA helped realize the vision of combining "German engineering with Silicon Valley spirit", making the company more attractive to customers and partners, which ultimately led to its acquisition by a US firm. Some respondents also pointed to intensive mentoring as the key to refining their ideas and pivoting more quickly in response to feedback from potential users: "We learned we needed to pivot, and the firsthand feedback from our target users was essential for future planning."

These comments offer tangible examples of GA's learning effects, revealing how on-the-ground mentorship and market exposure helped participants overcome internationalization barriers. Though such relationships and iterative feedback loops are hard to capture in observational data, the interview insights corroborate our quantitative evidence that GA participants gain meaningful advantages in foreign expansion. This qualitative evidence provides implicit support for our findings, suggesting that the knowledge gained through interactions with mentors and local partners and intensive mentoring played a crucial role in helping them navigate cultural norms and overcome barriers to internationalization.

The insights from the questionnaire underscore our empirical estimations. The responses from GA startups suggest that participating in the program and, especially, its social interactions helped them to expand their professional network and to internationalize, especially for startups with limited experience ex-ante. Hence, the qualitative analysis confirms Hypotheses 1–3. Taken together, the empirical and the qualitative analyses provide consistent evidence that emphasizes the practical relevance of the accelerator program in fostering the internationalization efforts of startups.

suggestive evidence that the positive assessment of the GA program is more likely for participants of on-site rather than online programs (see Figure IA2, Appendix), which corroborates our empirical results on Hypothesis 3.

6 Discussion

6.1 Contributions

We identify several main contributions of this study. Our evidence bears significant implications for practitioners and decision-makers. Given that venture capital frequently remains concentrated in a few well-established hubs, many European and Asian ventures face challenges in securing foreign capital and reaching diverse customer segments. Our findings show that accelerator participation can significantly increase the likelihood of attracting non-domestic investors and hiring talent from abroad, thus providing a practical roadmap for entrepreneurs who aim to expand their global reach. For them, accelerators act as a springboard to gain specialized knowledge and strategic insights vital for successful international market entry and subsequent growth abroad. Our findings, however, also show that participating in accelerators, which is costly along monetary and non-monetary dimensions, is not beneficial for everyone. Derived benefits are contingent on the startup program fit and prior experience of the founding team. Our findings, therefore, also have important implications for policymakers seeking to enhance regional or national innovation ecosystems: We show that supporting accelerator programs may foster cross-border collaboration and cultivate more diverse local talent pools, thereby strengthening their competitiveness in global markets. Still, the specific program design is crucial for triggering such benefits.

Aside from the practical implications, our study widens the understanding of the working of startup accelerators and, thereby, contributes to two key literature streams. First, we extend the literature on how accelerators affect startup growth (Gonzalez-Uribe and Leatherbee, 2018; Cohen *et al.*, 2019b,a; Hallen *et al.*, 2020; Yu, 2020; Hallen *et al.*, 2023; Assenova and Amit, 2024). Whereas previous research has largely focused on accelerators' roles in fostering customer traction, venture survival, and capital-raising, our findings indicate that accelerators can also drive international expansion by helping founders attract foreign investment and human capital. Through evidence showing that accelerators enable entrepreneurs to acquire the knowledge and information needed for overseas expansion and to refine market entry strategies, we highlight how accelerators' learning effects help ventures secure vital cross-border resources. In doing so, we contribute a new dimension to the literature on accelerators' impact by illustrating their role in facilitating global traction. Relatedly, our findings expand discussion on entrepreneurial learning (Politis, 2005; Nanda and Sørensen, 2010; Kacperczyk, 2013; Chatterji *et al.*, 2019). The paper highlights how learning through structured social interactions helps startups overcome

the liability of foreignness. By offering direct exposure to mentors, prospective investors, and local customers, entrepreneurs can acquire valuable knowledge to more effectively navigate unfamiliar cultural, legal, and market environments.

Second, we contribute to the international entrepreneurship literature by illustrating how structured, cohort-based support programs can address the liability of foreignness typically encountered by nascent ventures (McDougall and Oviatt, 2000; Zahra *et al.*, 2000; Oviatt and McDougall, 2005; Sapienza *et al.*, 2006; Zaheer, 1995). Although existing scholarship often emphasizes the importance of social capital and previous international exposure in mitigating cross-border risk (Balachandran and Hernandez, 2021; Naldi *et al.*, 2020), our study demonstrates how accelerators can act as intermediary sources of global connectivity and expertise for founders without such experience. By offering targeted mentorship and access to relevant local networks, accelerators bridge critical knowledge gaps and lessen uncertainties about entering overseas markets. This way, they are an important channel through which startups can attract financing from foreign investors. Consequently, our findings suggest that accelerator-induced learning may compensate for founders' international backgrounds when venturing abroad.

6.2 Generalizability, limitations, and future research

The spread of startup accelerators since the early 2000s marks a unique opportunity for startups to improve their scalability and growth. Our empirical setting focuses on one specific accelerator program in one specific country – The German Accelerator program, which by definition only supports startups incorporated in Germany. However, despite having natural limits to their uniform applicability, the implications of our findings are likely generalizable to accelerator programs and other firms.

While the GA has a specific format and provides distinct contents, its basic mechanisms and objectives are closely aligned with those of other comparable accelerators, such as the European Innovation Council's Soft-landing Programme. As a common characteristc, these accelerators aim to support startups international market entry by providing targeted learning opportunities that help entrepreneurs to gain a better understanding of cultural, legal, and normative aspects in the target market. Thereby, the overarching objective of the GA and like-minded non-US programs is to assist startups entering the US market, which remains the prime target for startups in their internationalization strategies (Cannone and Ughetto, 2015). Accordingly, the observed effects are likely indicative of other accelerators around

the globe. Additionally, our theoretical considerations, in particular on the learning mechanisms, are likewise transferable to other startup programs that are designed to assist international market entry.

It follows that the benefits observed for GA participants can also be relevant to startups participating in other programs. While our analysis focuses on very young, growth-oriented entrepreneurial startups from Germany, startups, irrespective of the country of origin or sectoral affiliation, should be able to experience operational benefits similar to those observed in our setting. As such, the basic mechanism of entrepreneurial learning opportunities is the same irrespective of the origin or business field of the startup. For example, the GA does not focus on specific industries, so sectoral differences should be less relevant. Further, despite having apparent differences, the German and the US startup ecosystem are more closely aligned than those of the US and other parts of the world, such as China or Japan (Chen, 2023). For startups from such regions, the benefits of participating in designated international accelerator programs might be even higher.

Still, our results have natural boundaries to their general applicability. It seems likely that accelerator programs designated to accessing specific markets, as the GA, could also be important in a domestic context. For example, an accelerator program in the US could be designed so that startups from rural areas in the periphery can learn from entrepreneurial hubs on the East or West Coast of the US. However, the implications of our study for these startups may be different since legal or cultural differences may be more nuanced. Also, in a domestic context, the reputation of the accelerator and, thus, the signaling value from participation might be a more prominent benefit than in our empirical setting. This would shift incentives to participate and the benefits from participants to a different set of startups.

Another natural limit of generalizability could be that the GA may work not despite but because of the fact that the German and US entrepreneurial ecosystems have certain commonalities. For example, European startups may find it comparatively easier to expand to markets, such as the US, that share cultural or institutional norms. While the underlying mechanisms most likely apply universally, the focus of our study is not to examine how these mechanisms differ across specific national or cultural contexts. In this context, the direction of knowledge transfer might also play a role. For example, accelerators that are located in well-developed ecosystems, such as the US-based 500 Global or Techstars Global Network, might require different learning tools since many of their programs seek to support ventures targeting less-developed ecosystems. Incorporating such differences and examining how cultural,

normative, or institutional differences shape accelerators' influence on ventures' international scaling would be an opportunity for future work.

Aside from this, our analysis remains subject to other limitations. First, it centers on the supply-side dimension of internationalization—namely, attracting investment and hiring foreign talent. Future studies could expand on our work by exploring demand-side growth, such as sales and revenues in target markets, to gain a more comprehensive understanding of international expansion. Second, although our findings highlight several beneficial effects of accelerators, they do not capture a critical dimension: the decision *not* to pursue internationalization. Indeed, some founders concluded in our qualitative interviews that entering foreign markets was not a viable option for them. For instance, survey respondents commented, "It made it clear that the US is not our market," and "We realized we will not manage go-to-market in the US (even with the help of GA and committing two people to it). Making that decision clear." As these examples show, there are other potential benefits of accelerator participation that were not captured in our study. Our empirical analysis does not fully account for the positive impact of choosing not to expand abroad, such as conserving resources for domestic growth—an area future research could investigate further. Lastly, our empirical setting does not allow us to separate the signaling and learning mechanisms fully. Our results provide robust evidence about the learning effects, and reputational effects should be constant across all participants (i.e., as all participated in the same program) in our sample. Still, we cannot entirely rule out that signaling effects simultaneously also have an impact. Notably, future research could benefit from analyzing multiple accelerators, allowing them to exploit differences in the reputation across accelerators to elicit their signaling values for startups that aim to enter foreign markets.

7 Conclusion

How does accelerator participation affect startup internationalization? To address this question, we analyze a unique accelerator program in Germany, the German Accelerator, in which participating ventures spend time in overseas markets, engage with local peers and customers, and receive structured mentorship. Based on this setting, our analysis explores the implications and underlying workings of accelerator programs designed to support startups' international market entry.

Our findings show that startups that complete this program secure more funding, particularly from

investors located in target markets, relative to a control group of firms that applied for the program but did not participate. Further, GA participants also hire relatively more employees in these target regions. Importantly, we exploit the impact of the COVID-19 pandemic on the GA program design to carve out the importance of social interaction as part of the entrepreneurial learning experience. Consistent with a learning mechanism, the switch to the online format lowers the positive effect of the GA. Moreover, heterogeneous treatment effects suggest that founders with limited prior international work experience derive the greatest benefit, consistent with a substitution effect in which the accelerator compensates for gaps in international experience in the founding team. We complement the quantitative assessment with online interviews, which deliver strong qualitative evidence emphasizing our findings. These outcomes collectively underscore the pivotal role accelerators can play in enabling startups to penetrate foreign markets and the importance of entrepreneurial learning mechanisms in this context.

In sum, our study not only underscores how accelerators can catalyze startups' global expansion but also enriches both theoretical and practical discussions on accelerating cross-border growth. By extending the conversation about accelerators into international contexts, we offer a nuanced understanding of how structured entrepreneurship programs can help ventures overcome international entry barriers and achieve robust growth in global markets.

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Tables and figures from the main part

Table 1: Descriptive statistics on sample startups

			Means		
	Startups	**Obs.**	**Pre**	**Post**	**Pre – Post**
Funding (1/0)	All startups	898	0.498	0.434	-0.064
	GA participant	471	0.537	0.471	-0.066
Funding (domestic investor)	All startups	898	0.370	0.305	-0.065
	GA participant	471	0.408	0.348	-0.060
Funding (foreign investor)	All startups	898	0.177	0.235	0.058
	GA participant	471	0.212	0.272	0.060
Funding volume	All startups	898	4.131	4.854	0.723
	GA participant	471	4.609	5.516	0.907
Funding volume (domestic investor)	All startups	898	2.920	3.600	0.680
	GA participant	471	3.503	4.318	0.813
Funding volume (foreign investor)	All startups	898	1.250	2.614	1.364
	GA participant	471	4.739	6.747	2.008
New hires (1/0)	All startups	699	0.956	0.912	-0.044
	GA participant	383	0.961	0.935	-0.026
New hires (domestic)	All startups	699	0.928	0.883	-0.045
	GA participant	383	0.935	0.909	-0.026
New hires (foreign)	All startups	699	0.203	0.721	0.518
	GA participant	383	0.227	0.768	0.541

Notes: This table displays statistics on startup characteristics related to their investment activity and the main dependent variables, i.e., successful firm exits and funding rates.

Table 2: Main startup characteristics by GA applicant

	GA applicants			**Differences in means**	
	(1) Accepted	**(2) Withdrawn**	**(3) Rejected**	**(1)–(2)**	**(1)–(3)**
Incorp. year	2014.96	2015.21	2015.51	-0.25	-0.55*
Team size	3.050	2.876	2.449	0.173	0.600***
Experience (tenure, total)	8.865	7.953	9.324	0.912	0.460
Experience (tenure, abroad)	0.408	0.335	0.395	0.073	0.013
Total funding (# deals)	1.136	1.318	0.691	-0.182	0.445***
Total funding (amounts)	4.609	5.350	3.020	-0.741	1.589***
Hiring (# employees)	2.974	2.787	2.171	0.187	0.802***
Hiring (foreign employees, 1/0)	0.227	0.180	0.172	0.047	0.055

Notes: This table displays summary statistics on startup characteristics of GA applicants. All values are measured before the start of the GA cycle. We distinguish startups that successfully applied (i.e., GA participants), that withdrew their application, and those whose application was rejected. The last two columns display the differences in means of the latter two startup types relative to GA participants. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 3: FE regressions explaining startup funding activities relative to GA participation

Dep. variable:	$ln(TotalFunding)$					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	1.789***	2.016**	1.204	0.538	0.179	-0.325
	(0.680)	(0.818)	(0.910)	(0.420)	(0.551)	(0.819)
Rejected	-0.126	0.228	-1.234	0.022	-0.511	-1.662**
	(0.921)	(0.773)	(0.284)	(0.333)	(0.513)	(0.058)
Observation period:	Post-GA			Pre-GA		
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	2.135	3.143	4.299	0.970	1.453	3.348
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.119	0.103	0.136	0.101	0.099	0.126
Obs.	687	687	687	687	687	687

Notes: The table displays OLS regressions explaining the effect of participating in the GA program on the total amount of external equity investments received, estimating Equation 1. The estimations use different specification on the timing of the investments and the origin of respective investors. Columns I-III consider investments that occured after respective startups participated in the GA program or, for rejected and withdrawn startups, after the program for which they initially applied has ended. Columns IV-VI refer to investments before the GA program. Further, funding refers to investments with at least one US investor (Columns I and IV), one investor not headquartered in Germany (Columns II and V), and investors from Germany (Columns III and VI). Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

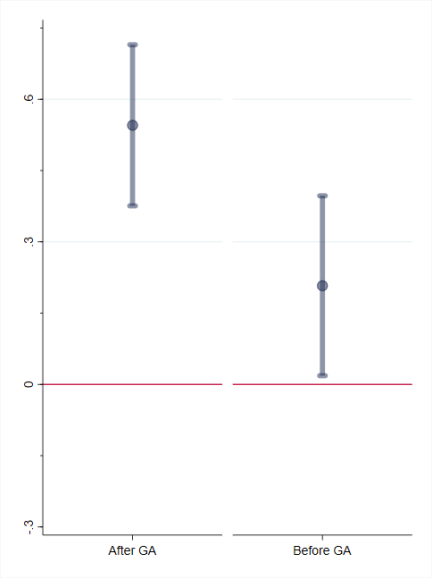
Table 4: Main effects distinguishing among on-sight and virtual programs

Dep. variable:	$ln(TotalFunding)$					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	2.577***	3.079***	1.810*	0.309	-0.050	-0.817
	(0.835)	(0.901)	(1.062)	(1.352)	(1.822)	(1.844)
Rejected	-0.169	0.885	-0.285	-0.284	-1.632	-4.115**
	(0.735)	(0.858)	(1.096)	(1.264)	(1.770)	(1.795)
Sample:	In-person programs			Virtual programs		
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	2.351	3.380	4.384	1.679	2.611	4.171
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.153	0.161	0.161	0.119	0.121	0.181
Obs.	453	453	453	227	227	227

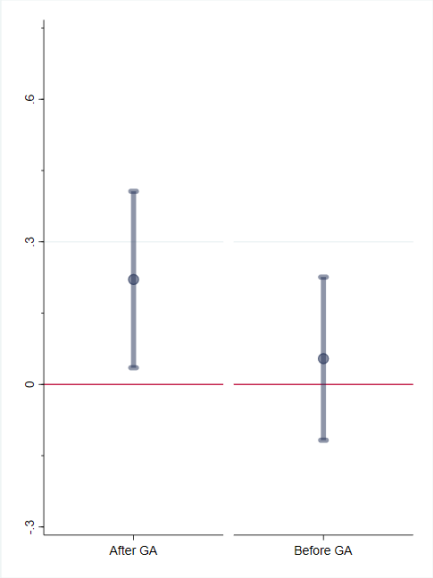
Notes: The table displays regression estimates similar to the baseline specifications but for different subsamples. Columns I-III repeat the first three columns from Table 3 considering the GA programs that required startup founders to spend time on-sight at an international startup hub. Conversely, Columns IV-VI use a subsample of startups that participated mostly in online programs due to the COVID-19 pandemic and those that participated in a national program that did not require an international exchange. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Figure 1: The GA program and hiring activities of participating startups

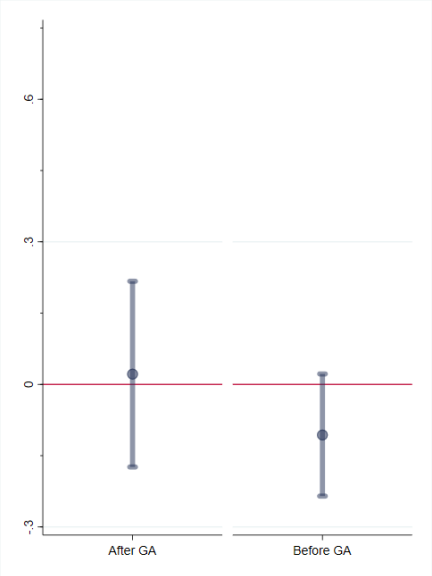
Panel A: US employees (in logs.)



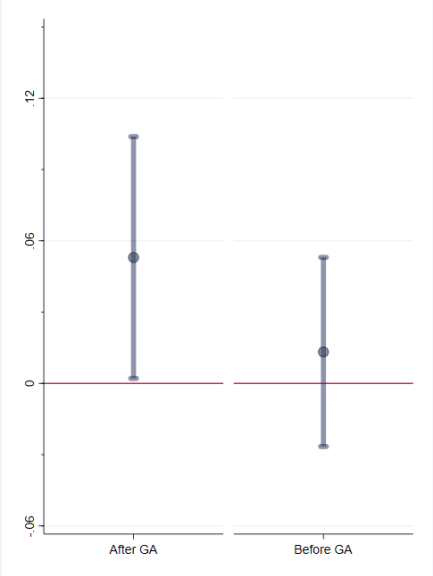
Panel B: Foreign employees (in logs.)



Panel C: Domestic employees (in logs.)



Panel D: Share of foreign employees

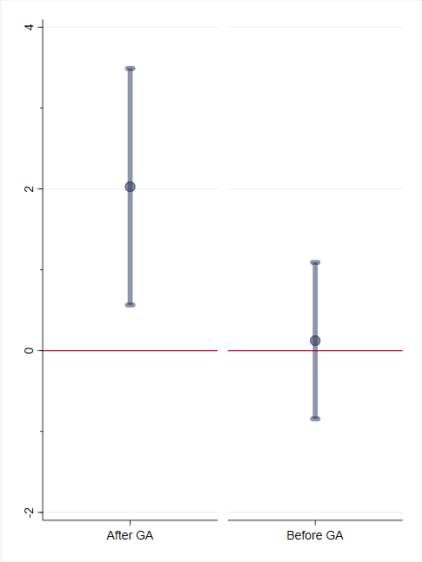


Notes: The graph plots regression coefficients from estimates on the relation between the GA program and startups hiring activities. Panels A-C repeat the baseline estimation from Equation 1 using the logarithm of total hirings (z-standardized) as dependent variable. As before, the effects are separately estimated for the time span before and after the GA program. Estimations distinguish hirings from the US (Panel A), any country other than Germany (Panel B), and Germany (Panel C). Panel D is similar to before, only here the dependent variables is the share of foreign employees among the total workforce. Hence, the coefficient plots resemble the differential amount or share of GA participants' employees relative to startups that withdrew their application for the program. Whiskers span the 90 percent confidence interval.

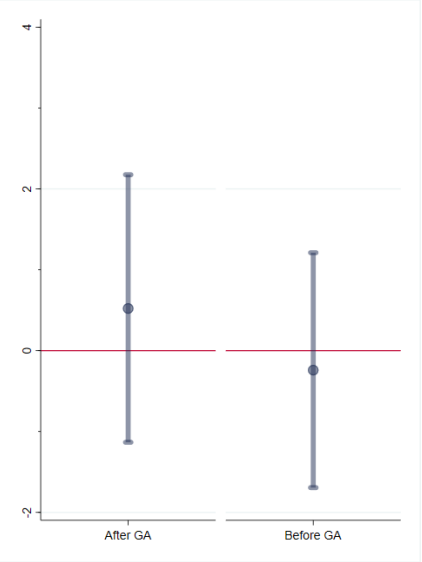
Figure 2: Ex-ante internationalization and accelerators' learning and signalling effects

Panel A: Total funding of startups with low ex-ante internationalization

Funding by foreign investors

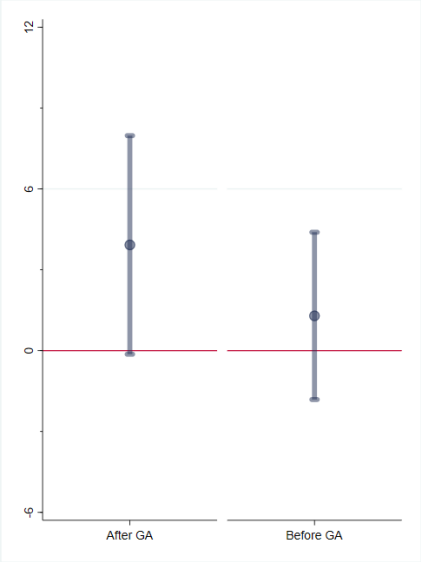


Funding by domestic investors

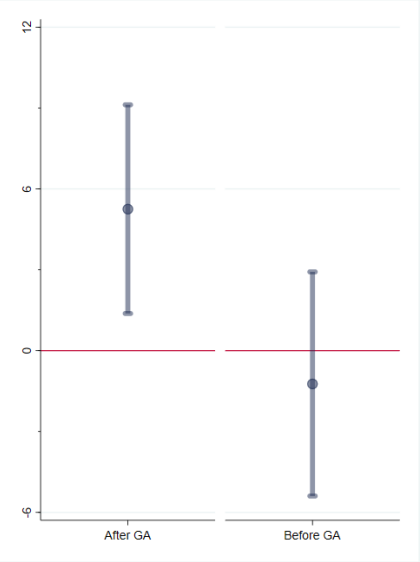


Panel B: Total funding of startups with high ex-ante internationalization

Funding by foreign investors

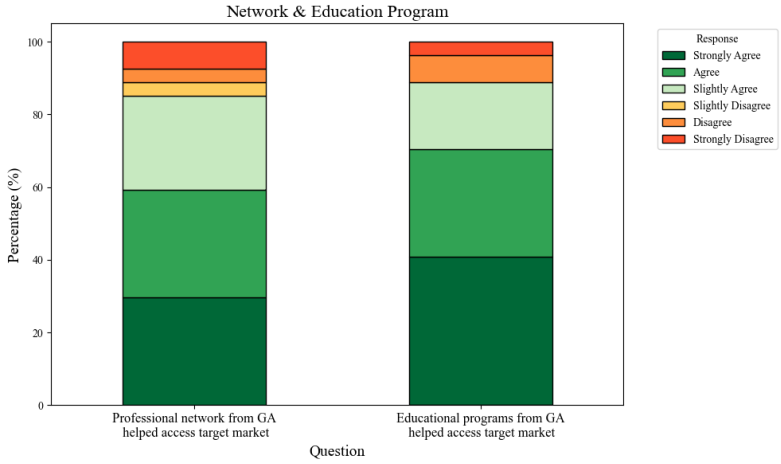


Funding by domestic investors



Notes: These graphs display results on treatment heterogeneity in terms of startups pre-treatment internationalization. The underlying estimations repeat the baseline analysis as displayed in Table 3. The graphs display coefficients on the *Participated* dummy from different split sample regressions, distinguishing startups' degree of internationalization as measured before participating in the GA program. We distinguish internationalized and not (-yet) internationalized startups, measured by whether they have (Panel B) or do not have (Panel A) employees working outside of Germany. Further, each panel distinguishes funding by foreign and domestic investors, both before and after respective startups have participated in the GA program. Whiskers span the 90 percent confidence interval.

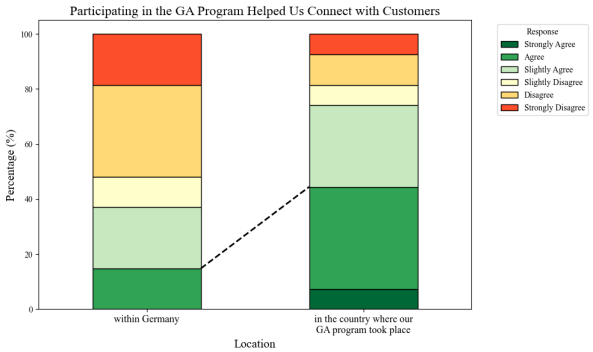
Figure 3: Survey results on the general benefits of the GA program



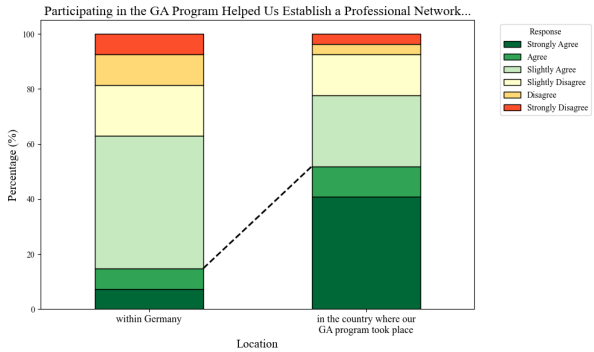
Notes: These graphs display results on the survey question: "". Respondents have the option to answer on a Likert-scale with the options strongly disagree, disagree, weakly disagree, weakly agree, agree, and strongly agree. The total number of respondents is 27. These responses refer to Questions 6 and 7 of the online questionaire for GA alumni, as displayed in Appendix B.

Figure 4: Survey results on the internationalization benefits of the GA program

Panel A: Customers



Panel B: Professional network



Notes: These graphs display results on the survey question: "". Respondents have the option to answer on a Likert-scale with the options strongly disagree, disagree, weakly disagree, weakly agree, agree, and strongly agree. The graph considers distinguishes customers and professional networks in Germany and in the target country where the program took place. The total number of respondents is 27. These responses refer to Questions 4 and 5 of the online questionaire for GA alumni, as displayed in Appendix B.

FOR ONLINE PUBLICATION

Internet Appendix A : Additional tables and figures

Table IA1: Program overview of the German Accelerator

Purpose	Duration	Cost	Format	Content
Market Access Program:				
Receive tailored guidance, develop go-to-market strategy, and enter a new market successfully	3-6 months (typically 3)	Free of Charge	Offline; in the respective overseas market	1. Practical tools to assess internationalization 2. 1:1 mentor coaching 3. Workshops with industry experts 4. Network access to mentors, investors, GA partners, and potential customers 5. Participation in Immersion Week for in-depth market knowledge and local network access 6. Introductions to potential clients and partners 7. Strategic and operational support on product-market fit, strategy, etc. 8. Access to offices in German Accelerator locations
Market Discovery Program:				
Advanced education on testing and validating business models, expanding networks, and meeting potential customers	6-9 weeks	500 Euros (max. three participants per startup)	Virtual and offline in the overseas market	Same as the Market Access Program
Kickstart Program (prev. GA Academy):				
Basic training on the essentials of internationalization to determine the optimal market for participants' product or service	2 weeks	Free of Charge	Virtual; plus two days on-site in Germany	Points 1-3 of the Market Access Program

Notes: This table summarizes all programs offered by the German Accelerator that are relevant for our study. Most importantly, this includes the Market Access programs. Our analysis further covers the Discovery programs and the Kickstart programs. The latter is an important addition to test the importance of social interaction in the context of entrepreneurial learning opportunities. All programs are targeted to German startups.

Table IA2: List of variables

Dependent variables	
ln(TotalFunding)	Logarithm of total funding received from external equity investors. In general, this amount includes any such funding at any time and from any type of investor. However, in the empirical analysis, this variable distinguishes the timing of investments and the location of the investor. The former refers to mostly to pre- and post-German Accelerator investments, or other specific timelines. The latter refers to German (i.e., domestic) investors, foreign investors, or US-based investors, which is denoted as *Domestic*, *Abroad*, and $Abroad^{US}$, respectively. The location refers to the headquarter of the investor.
ln(TotalFunding) z-std.	The z-standardized value of $ln(TotalFunding)$. In the empirical analysis this variables distinguishes specific timings and investor locations.
I(AnyDeal)	Dummy equal to one for all startups that received at least one investment from an external equity investor, and zero otherwise. In the empirical analysis this variables distinguishes specific timings and investor locations.
FundingRounds	A count variable equal to the total number of deals a startup obtained from external equity investors. In the empirical analysis this variables distinguishes specific timings and investor locations.
ln(Hirings)	The total number of employees employed by a startup at a given point in time (in logs). In the empirical analysis this variables distinguishes specific timings and investor locations.
ln(Hirings) z-std.	The z-standardized value of $lnHirings$. In the empirical analysis this variables distinguishes specific timings and investor locations.
Independent variables	
Participated	Dummy equal to one for all startups that successfully applied *and* eventually participated in one of the German Accelerator Programs anytime before August 2023, and zero otherwise
Rejected	Dummy equal to one for all startups whose application for one of the German Accelerator Programs anytime before August 2023 was rejected, and zero otherwise
meanexp_tenure	A count variable equal to the time-invariant, startup-specific average work experience of the focal startups' founder team in years measured at incorporation of the focal startup.
I(serialfounder)	Dummy equals one if at least one founder in the founding team has previously founded a startup before founding the focal startup and zero otherwise.
nbr_founders	The total number of individual founders of the focal startup.
work_abroad	Dummy equal to one if at least one founder of the focal startup has worked outside of Germany before founding the focal startup that eventually applied at any of the German Accelerator Programs. In the empirical analysis this variables distinguishes investor locations.

Table IA3: Descriptive statistics main sample

Panel A: Startup characteristics – time-invariant

	Obs.	**Mean**	**SD**	**Q25**	**Median**	**Q75**
Age at reference period	873	3.696	3.543	1	3	5
FundingRounds	898	1.930	2.191	0	1	3
FundingRounds (GER investor)	898	1.158	1.555	0	1	2
FundingRounds (US investor)	898	0.414	0.973	0	0	0
nbr_founders	699	2.833	1.765	2	2	4
FT experience (*I(serialfounder)*)	698	0.516	0.500	0	1	1
FT experience (*meanexp_tenure*)	699	8.897	5.612	5	8	11.8
FT experience (*work_abroad*)	699	0.615	0.487	0	1	1
FT experience ($work\_abroad^{US}$)	699	0.257	0.438	0	0	1

Panel B: Startup main locations

		Share in %		
Federal state	**Obs.**	**Overall**	**GA participants**	**Non-participants**
Berlin	249	27.7	27.5	29.0
Bavaria	201	22.4	24.6	19.9
North Rhine-Westphalia	117	13.0	13.1	13.0
Baden-Wuerttemberg	76	8.5	8.7	8.2
East German states	67	7.5	8.5	6.3
Other states	188	20.9	17.6	23.6

Panel C: Startup main sectors

		Share in %		
Sectors	**Obs.**	**Overall**	**GA participants**	**Non-participants**
Information technology	286	53.7	53.2	54.3
Manufacturing	103	19.3	20.3	17.9
Professional, Scientific, and Technical Services	78	14.6	14.8	14.4
Other	66	12.4	11.7	13.4

Table IA4: Baseline estimates using z-standardized dependent variables

Dep. variable:	$ln(TotalFunding)$ z-std.					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	0.350***	0.336**	0.180	0.159	0.043	-0.055
	(0.133)	(0.136)	(0.136)	(0.124)	(0.133)	(0.139)
Rejected	-0.126	0.038	-1.234	0.022	-0.123	-1.662**
	(0.119)	(0.129)	(0.136)	(0.118)	(0.124)	(0.137)
Observation period:	Post-GA			Pre-GA		
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	0.079	0.088	0.104	0.054	0.049	0.073
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.119	0.103	0.136	0.101	0.099	0.126
Obs.	687	687	687	687	687	687

Notes: This table displays regression results equivalent to the baseline estimates from Table 3. Only here, the dependent variable is z-standardized to allow for a better comparison across columns. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table IA5: Robustness tests on the baseline estimates

Panel A: Alternative dependent variables

Dep. variable:	I($AnyDeal$)			$FundingRounds$		
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	0.125***	0.099*	0.094	0.355***	0.303	0.052
	(0.046)	(0.054)	(0.060)	(0.119)	(0.192)	(0.238)
Rejected	0.014	0.005	-0.054	0.105	-0.021	-0.506**
	(0.045)	(0.055)	(0.062)	(0.111)	(0.184)	(0.234)
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	0.188	0.272	0.357	0.495	0.787	1.370
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.105	0.099	0.123	0.133	0.119	0.193
Obs.	687	687	687	687	687	687

(*Continued on next page*)

Table IA5: *continued*

Panel B: Alternative model specifications variables

Dep. variable:	I(*AnyDeal*)			*FundingRounds*		
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	1.384**	1.656**	0.839	2.075***	2.094**	1.813*
	(0.622)	(0.726)	(0.820)	(0.705)	(0.845)	(0.929)
Rejected	-0.518	-0.270	-1.375*	-0.128	0.095	-1.085
	(0.553)	(0.676)	(0.798)	(0.623)	(0.792)	(0.926)
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	0.079	0.082	0.108	0.147	0.135	0.158
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
GA program FE				✓	✓	✓
Startup-level controls				✓	✓	✓
R^2	1.784	2.684	3.701	2.135	3.143	4.299
Obs.	870	870	870	687	687	687

Panel C: Investor location solely based on lead investor location

Dep. variable:	*ln*(*TotalFunding*)			*FundingRounds*		
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	1.079*	1.250	0.552	0.143***	0.099*	0.017
	(0.574)	(0.842)	(0.679)	(0.054)	(0.054)	(0.078)
Rejected	-0.117	-0.543	-0.020	0.037	0.005	-0.028
	(0.503)	(0.808)	(0.684)	(0.047)	(0.055)	(0.083)
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	1.388	2.936	2.320	0.153	0.272	0.252
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.107	0.112	0.078	0.110	0.099	0.090
Obs.	687	687	687	687	687	687

Notes: This table robustness tests on the baseline estimates from Table 3. Panel A uses alternative dependent variables, repeating the baseline estimates from Columns I-III in Table 3. Only here, the dependent variable is a binary indicator, equal to one for all startups that raised at least one VC funding round after the GA program (Columns I-III), and a count variable on all VC funding rounds after the GA program (Columns IV-VI), respectively. Panel B also repeats the estimates from Columns I-III in Table 3 but deploys different sets of control variables. Columns I-III remove startup-level controls, i.e., to use a larger set of startups, and Columns IV-VI are similar to the baseline estimates but also control for GA program fixed effects. Panel C is similar to the previous specifications on the post-GA funding activities but only considers the lead investors' headquarter location to determine the origin of investors. As dependent variables, Columns I-III use total VC funding collected, as in the baseline specifications, and Columns IV-VI use the total number of funding rounds collected, as in Columns IV-VI of Panels A and B. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table IA6: Tests on potential measurement errors

Panel A: Testing truncation issues with the dependent variable

Dep. variable:	$ln(TotalFunding)^{+/-4yrs.}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Participated	1.538**	1.888**	0.764	0.537	0.161	-0.386	1.829***	1.975**	0.324
	(0.620)	(0.762)	(0.898)	(0.420)	(0.551)	(0.815)	(0.688)	(0.845)	(0.992)
Rejected	-0.077	0.295	-1.715*	0.019	-0.520	-1.602**	0.278	0.624	-1.698
	(0.561)	(0.721)	(0.891)	(0.399)	(0.514)	(0.806)	(0.615)	(0.799)	(1.003)
Observation period:	Post-GA			Pre-GA			Post-GA, excl. 2021, 2022		
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	1.835	2.718	4.001	0.970	1.436	3.348	2.067	3.001	4.413
Startup-level controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.114	0.086	0.121	0.100	0.100	0.121	0.129	0.097	0.143
Obs.	687	687	687	687	687	687	496	496	496

Panel B: Baseline regression, excluding rejected startups

Dep. variable:	*FundingRounds*					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	1.922***	2.296**	1.195	0.557	0.208	-0.286
	(0.741)	(0.881)	(0.954)	(0.464)	(0.603)	(0.851)
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	2.699	3.694	5.002	1.197	1.795	3.961
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.130	0.108	0.136	0.124	0.111	0.108
Obs.	463	463	463	463	463	463

Notes: This table presents estimates testing the robustness of the model specification of the baseline estimates from Table 3. Panel A tests potential truncation issues by using alternative dependent variables. The specifications in Columns I-VI repeat the baseline estimates from Table 3 using a modified dependent variable, total funding. Here, it only considers the total funding amounts raised in the first four years after (Columns I-III) and before (Columns IV-VI) the GA program. Columns VII-IX repeat the estimates from the first three columns but also exclude any observations from the GA cycle years 2021 and 2022. In Panel B, the specifications repeat the baseline estimates but remove rejected startups from the sample. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table IA7: The GA program and startup hiring activities

Panel A: Z-standardized logarithm of new employee hirings

Dep. variable:	$ln(Hirings)$ z-std.					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	0.545***	0.221*	0.022	0.208*	0.054	-0.106
	(0.103)	(0.113)	(0.119)	(0.115)	(0.104)	(0.078)
Rejected	0.196**	-0.105	-0.278**	0.009	0.085	-0.236**
	(0.096)	(0.114)	(0.125)	(0.103)	(0.109)	(0.089)
Observation period:	Post-GA			Pre-GA		
Employee origin:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	0.004	0.003	0.013	0.005	0.005	0.007
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.266	0.284	0.292	0.145	0.288	0.501
Obs.	687	687	687	687	687	687

Panel B: Logarithm of new employee hirings

Dep. variable:	$ln(Hirings)$					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	0.618***	0.354*	0.038	0.048*	0.021	-0.051
	(0.117)	(0.181)	(0.206)	(0.026)	(0.041)	(0.038)
Rejected	0.222**	-0.168	-0.482**	0.002	0.033	-0.114**
	(0.109)	(0.184)	(0.216)	(0.024)	(0.043)	(0.043)
Observation period:	Post-GA			Pre-GA		
Employee origin:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	0.654	1.644	2.972	0.062	0.183	1.103
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.266	0.284	0.292	0.145	0.288	0.501
Obs.	687	687	687	687	687	687

(*Continued on next page*)

Table IA7: *continued*

Panel C: Post-GA hiring activities distinguishing observations before and after 2019

Dep. variable:	$ln(Hirings)$					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	0.904***	0.615**	0.456*	0.158	-0.070	-0.746**
	(0.160)	(0.245)	(0.266)	(0.180)	(0.269)	(0.291)
Rejected	0.393**	0.022	-0.101	-0.112	-0.501*	-1.184***
	(0.157)	(0.266)	(0.289)	(0.166)	(0.262)	(0.295)
Sample:	In-person programs			Virtual programs		
Employee origin:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	0.929	2.085	3.512	0.383	1.221	2.471
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.281	0.258	0.308	0.170	0.220	0.209
Obs.	330	330	330	351	351	351

Notes: The table presents regression estimates explaining the effect of the GA program on startup hiring activities. The first two panels display the corresponding estimates of the coefficient plots in Figure 1. Panel A shows the results from estimating Equation 1 using the z-standardized logarithm of total hiring as dependent variable, comprising hirings after the GA participation (Columns I-III) and before (Columns IV-VI). Specifically, Figure 1 displays the coefficient estimates of the *Participated* dummy variable from these estimates. Panel B is similar to before. Only here, the dependent variable is not z-standardized but instead the logarithm of total hiring. Panel C displays robustness tests and is equivalent to the baseline estimations from Columns I-III of Table 3 but uses the logarithm of hirings as dependent variable, as in Panel B. Also, the sample is split into observations from before and after 2019 (Columns I-III and IV-VI, respectively). Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table IA8: On-sight versus virtual programs – additional tests

Panel A: Difference-in-Differences estimations on funding activities

Dep. variable:	$ln(TotalFunding)$					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	2.600***	3.268***	1.954*	2.812***	3.699***	2.049*
	(0.800)	(0.889)	(1.026)	(0.869)	(0.970)	(1.068)
Participated × *Virtual*	-2.619*	-4.267**	-2.662	-2.968*	-4.711**	-2.877
	(1.477)	(1.908)	(2.037)	(1.543)	(1.955)	(2.105)
Virtual	1.423	3.796*	2.922	2.132	4.395**	2.851
	(1.553)	(1.970)	(2.162)	(1.747)	(2.148)	(2.405)
Rejected	0.020	1.228	-0.101			
	(0.697)	(0.835)	(1.048)			
Rejected × *Virtual*	-0.779	-3.543*	-3.836*			
	(1.380)	(1.876)	(2.024)			
Investor location:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	2.135	3.143	4.299	2.699	3.694	5.002
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.127	0.112	0.142	0.138	0.121	0.140
Obs.	687	687	687	463	463	463

Panel B: Post-GA hiring activities distinguishing in-person and virtual programs

Dep. variable:	$ln(Hirings)$					
	(1)	(2)	(3)	(4)	(5)	(6)
Participated	0.805***	0.563***	0.370	0.141	-0.086	-0.710**
	(0.835)	(0.901)	(1.062)	(1.352)	(1.822)	(1.844)
Rejected	0.348**	-0.062	-0.123	-0.177	-0.556*	-1.432***
	(0.735)	(0.858)	(1.096)	(1.264)	(1.770)	(1.795)
Sample:	In-person programs			Virtual programs		
Employee origin:	Abroad^{US}	Abroad	Domestic	Abroad^{US}	Abroad	Domestic
Mean DV	0.812	1.884	3.232	0.308	1.139	2.451
Startup-level controls	✓	✓	✓	✓	✓	✓
GA-cycle year FE	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
R^2	0.278	0.286	0.307	0.151	0.252	0.274
Obs.	453	453	453	227	227	227

Notes: Panel A displays robustness tests for Table 4 using the full sample and differences-in-differences type regressions. In Columns I-III, we add an indicator variable, *Virtual*, that is equal to one for all startups that participated in online or domestic programs due to the Covid 19 pandemic and those that participated in a national program that did not require an international exchange and zero otherwise. Additionally, estimates contain an interaction term of this indicator with the *Participated* and *Rejected* dummy variables, capturing the potential moderating effect for respective startups. Specifications in Columns IV-VI repeat this approach but exclude all rejected startups from the sample. Panel B displays regression estimates similar Panel A of Table 4, only here the dependent variables are the logarithm of total post-GA hirings, distinguishing employees from the US (Columns I and IV), outside of Germany (Columns II and V), and from Germany (Columns III-VI), respectively. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table IA9: Learning and signalling effects of startups with and without ex-ante internationalization

Panel A: Foreign employees as indicators for startups' international experience

Dep. variable:	$ln(TotalFunding)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participated	2.028**	0.124	0.522	-0.241	4.809*	1.680	5.512**	-0.142
	(0.888)	(0.587)	(1.004)	(0.881)	(2.523)	(1.886)	(2.365)	(2.441)
Rejected	-0.162	-0.684	-1.719*	-1.766**	2.854	-0.505	1.372	-2.010
	(0.822)	(0.530)	(1.003)	(0.861)	(2.550)	(1.860)	(2.219)	(2.374)
Ex-ante experience:	Without international experience				With international experience			
Investor origin:	Abroad		Domestic		Abroad		Domestic	
Timing of funding:	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA
Mean DV	3.005	1.290	4.141	3.231	3.724	2.061	4.975	3.835
GA-cycle year FE	✓	✓	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.082	0.074	0.124	0.111	0.185	0.270	0.329	0.289
Obs.	545	545	545	545	137	137	137	137

Panel B: Founding teams' work experience abroad as indicator for startups' international experience

Dep. variable:	$ln(TotalFunding)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participated	2.105*	0.910	-1.380	-0.896	1.936	0.024	2.794**	-0.026
	(1.107)	(0.748)	(1.391)	(1.205)	(1.319)	(0.906)	(1.297)	(1.233)
Rejected	0.475	-0.174	-2.750**	-1.726	-0.695	-0.887	-0.719	-2.136*
	(0.967)	(0.613)	(1.368)	(1.111)	(1.285)	(0.874)	(1.326)	(1.253)
Ex-ante experience:	Without international experience				With international experience			
Investor origin:	Abroad		Domestic		Abroad		Domestic	
Timing of funding:	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA
Mean DV	2.274	1.069	3.353	2.413	3.714	1.675	4.895	3.857
GA-cycle year FE	✓	✓	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.144	0.145	0.174	0.147	0.108	0.144	0.159	0.133
Obs.	262	262	262	262	421	421	421	421

(*continued on next page*)

Table IA9: *continued*

Panel C: Robustness tests considering investments from US investors only

Dep. variable:	$ln(TotalFunding)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participated	1.833**	0.613	2.647	1.440	1.868**	0.796	1.744	0.607
	(0.742)	(0.417)	(2.193)	(1.582)	(0.823)	(0.636)	(1.151)	(0.703)
Rejected	-0.164	-0.051	-0.570	-0.166	0.482	-0.157	-1.168	-0.178
	(0.657)	(0.380)	(2.053)	(1.584)	(0.736)	(0.541)	(1.073)	(0.670)
Experience measure:	Foreign employees				International work experience			
Level of experience	Low		High		Low		High	
Timing of funding:	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA
Mean DV	2.038	0.926	2.596	1.178	1.356	0.746	2.639	1.118
GA-cycle year FE	✓	✓	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.092	0.081	0.203	0.262	0.192	0.127	0.117	0.118
Obs.	545	545	137	137	262	262	421	421

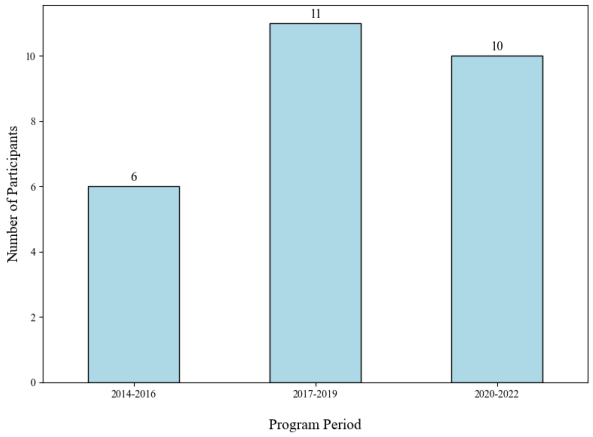
Panel D: Placebo test: Distinguishing startups in terms of the general founding team work experience

Dep. variable:	$ln(TotalFunding)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participated	1.896*	0.066	1.295	-0.692	2.398*	0.770	1.456	0.544
	(1.134)	(0.781)	(1.249)	(1.119)	(1.276)	(0.764)	(1.412)	(1.198)
Rejected	-0.070	-1.314*	-1.619	-2.271**	-0.139	0.151	-1.342	-1.263
	(1.064)	(0.734)	(1.218)	(1.094)	(1.195)	(0.700)	(1.418)	(1.187)
Ex-ante experience:	Without high work experience				With low work experience			
Investor origin:	Abroad		Domestic		Abroad		Domestic	
Timing of funding:	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA	Post GA	Pre GA
Mean DV	3.190	1.643	4.196	3.074	3.079	1.293	4.428	3.625
GA-cycle year FE	✓	✓	✓	✓	✓	✓	✓	✓
Founding year FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.087	0.134	0.175	0.156	0.162	0.149	0.166	0.171
Obs.	326	326	326	326	358	358	358	358

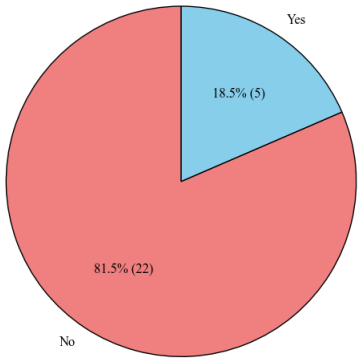
Notes: These tables display results on treatment heterogeneity in terms of startups pre-treatment internationalization. The estimations repeat the baseline analysis as displayed in Table 3, Columns II-III and V-VI. Unlike before, the regressions are estimated using split samples, distinguishing startups' degree of internationalization as measured before participating in the GA program. Panel A distinguishes startups with (Columns I-IV) and without (Columns V-VIII) employees working outside of Germany. Panel B distinguishes startups below (Columns I-IV) and above (Columns V-VIII) the median international work experience of the startups founder team. Work experience is measured using the average tenure spend outside of Germany of all members of the founder team. Panel C is a placebo-like test. Here, the sample is split according to startups with an average general work experience (i.e., inside and outside of Germany) below (Columns I-IV) and above (Columns V-VIII) the median, respectively. Panel D repeats the settings from Panel A (Columns I-IV) and B (Columns V-VIII) but considers only investments from US investors, similar to Columns I and IV of Table 3. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Figure IA1: Descriptive features of the survey respondents

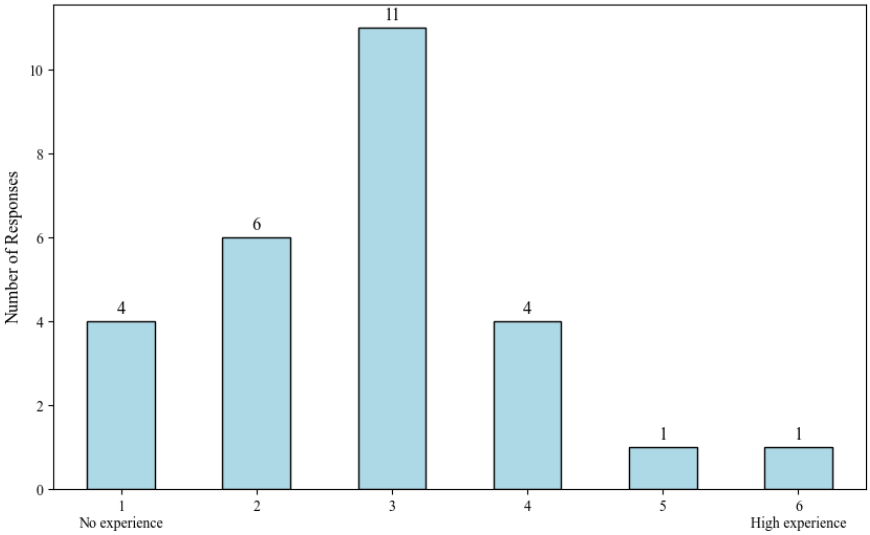
Panel A: The timing of participation



Panel B: Prior exposure to international investors



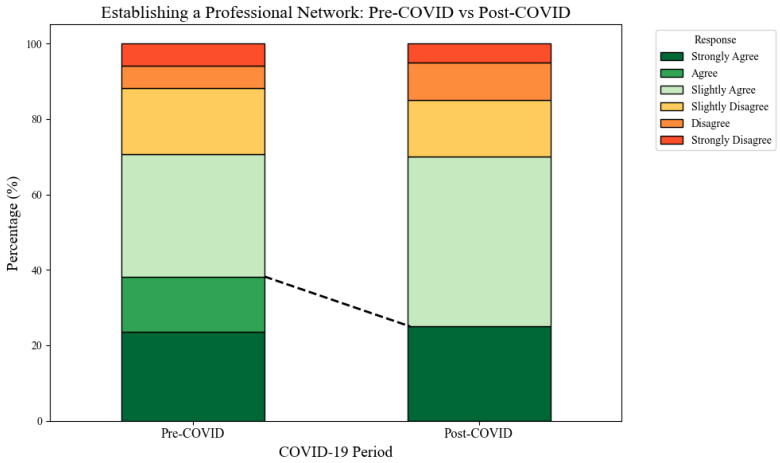
Panel C: Ex ante levels of experience in target market



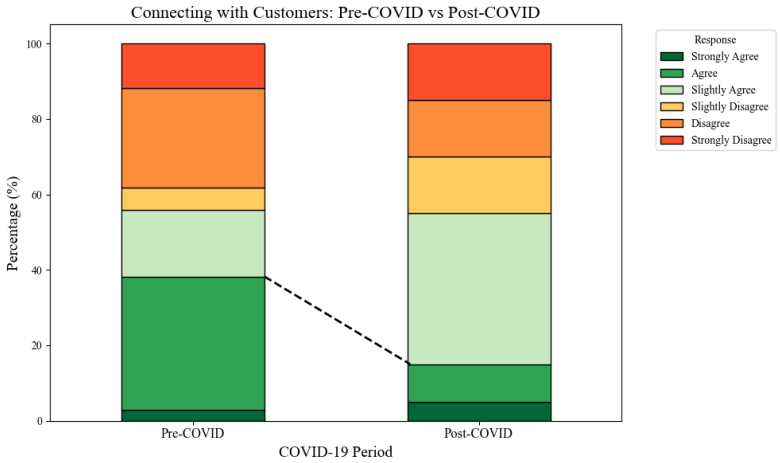
Notes: These graphs display basic characteristics on the survey respondents in terms of the cohort in which they participated (Panel A) and their prior experience with international investors (Panel B) or the target market (Panel C). The total number of respondents is 27. These responses refer to Questions 1-3 of the online questionaire for GA alumni, as displayed in Appendix B.

Figure IA2: Distinguishing responses on pre- and post COVID-19 programs

Panel A: Pre-COVID network effects



Panel B: Post-COVID network effects



Notes: These graphs display survey responses similar to those displayed in Figure 4 (Panel B). Only here, we distinguish responses from GA alumni participating in programs that took place before (Panel A) and after (Panel B) the outbreak of the COVID-19 pandemic, which were identified using respondents answers to Question 1 of the online questionaire for GA alumni, as displayed in Appendix B. The total number of respondents is 27.

Internet Appendix B : Online questionaire for GA alumni

Survey on the Impact of the German Accelerator Program

Thank you for taking the time to participate in this survey. We are conducting this survey to understand the impact of the German Accelerator Program on the growth of startups. Your insights are extremely valuable to us and will greatly contribute to our research. Please be assured that all responses are confidential, and no personal or location data will be shared. The survey takes approximately 10 minutes to complete and is optimized for desktop use.

Q1. In which time period did you first participate in the German Accelerator (GA) program?

(1) 2012-2013

(2) 2014-2016

(3) 2017-2019

(4) 2020-2022

Q2. Before participating in the GA program, did your startup already have investors from the target market?

(1) Yes

(2) No

Q3. Before participating in the GA program, how would you describe your level of professional experience with the target market? Please rate on a scale from 1 to 6, where 1 means "No experience" and 6 means "High experience."

(1) 1

(2) 2

(3) 3

(4) 4

(5) 5

(6) 6

Please state whether you agree/disagree with the following statements:

Q4. "Participating in the GA program helped us to establish a professional network..."

	Strongly disagree	**Disagree**	**Slightly disagree**	**Slightly agree**	**Agree**	**Strongly agree**
... within Germany.	☐	☐	☐	☐	☐	☐
... in the country where our GA program took place.	☐	☐	☐	☐	☐	☐

Q5. "Participating in the GA program helped us to connect with customers..."

	Strongly disagree	**Disagree**	**Slightly disagree**	**Slightly agree**	**Agree**	**Strongly agree**
... within Germany.	☐	☐	☐	☐	☐	☐
... in the country where our GA program took place.	☐	☐	☐	☐	☐	☐

Q6. "The professional network established through participation in the GA program helped us learn how to better access our target market."

Strongly disagree	**Disagree**	**Slightly disagree**	**Slightly agree**	**Agree**	**Strongly agree**
☐	☐	☐	☐	☐	☐

Q7. "The educational programs provided by the GA program, such as mentorship, workshops, and expert advice, helped us learn how to better access our target market."

Strongly disagree	**Disagree**	**Slightly disagree**	**Slightly agree**	**Agree**	**Strongly agree**
☐	☐	☐	☐	☐	☐

Q8. Your company may have benefited from the GA program in other ways than those considered so far in the survey. If so, please describe briefly how the program has benefited your company. (Open-ended Question)