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Growing up but staying home: Patient equity investors and firm scale-up

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ABSTRACT

Sustained and inclusive economic development is the product of mature firms, commonly referred to as scale-ups. While some studies suggest equity investors enable firm growth, others argue equity-backed startups are more likely to be acquired or relocate to more developed regions. To address this ambiguity, we examine the Israeli high-tech sector, where a growing number of startups are scaling up locally. Building on existing literature and exploratory interviews with industry members, we focus on how investors' business strategies and founders' characteristics shape startups' ability to scale up locally. We argue that local scale-up is most likely in cases where equity funds act as patient capital and invest in startups founded by experienced entrepreneurs or founders who are highly embedded within the local eco-system. Exponential competing risk models of the growth outcomes of 5689 Israeli high-tech firms established between 2005 and 2020 largely confirm our claims. We discuss how our results inform understanding of equity investors' impact on scale-up and public policies that can support more inclusive innovation ecosystems.

1. Introduction

Significant scholarly attention is given to technological startups. Yet, sustained and inclusive economic growth and development are often the product of mature and profitable firms, commonly called “scale-ups” (Berger, 2013; Breznitz, 2021; Shane, 2009). Scale-ups create more jobs, generate more exports and larger productivity gains, and produce more innovation and knowledge spillovers than fledgling startups (Denney et al., 2023; Jansen et al., 2023). Accordingly, governments worldwide have been pursuing policies to attract or encourage equity investors in the hope of creating more scale-ups in their local economies (Shane, 2009; Drover et al., 2017; Hall and Lerner, 2010; Duruflé et al., 2017; Quas et al., 2022). However, whether equity investors enable startups to scale up locally remains unclear.

One group of studies argues that certain types of equity investors can contribute to firm scale-up. These studies stress equity investors' ability to provide startups with the necessary growth capital, as well as organizational knowledge and access to key personnel, potential clients, and customers, all of which are vital ingredients for scale-up (Hall and Lerner, 2010; Bertoni et al., 2011). Moreover, recent scholarship has highlighted the growing prevalence of patient investors whose long-term investment strategy is particularly favorable for scale-up (Duruflé et al., 2017; Rahman and Thelen, 2019; Klingler-Vidra, 2016; Deeg and Hardie, 2016; Block et al., 2018).

Other studies, however, have argued that financing from equity investors tends to be detrimental to local scale-up, especially outside developed high-tech clusters like Silicon Valley or Boston's Route 128 (Breznitz, 2021; Hellmann and Thiele, 2023). Because of equity investors' short-term investing model, they tend to encourage their invested firms to seek a quick ‘exit’ rather than grow into mature firms (Hall and Lerner, 2010; Duruflé et al., 2017). Moreover, equity investors headquartered in the main innovation clusters commonly encourage or even require the startups they back to relocate to more developed ecosystems where they can be closer to key markets and enjoy greater access to vital resources (Weik et al., 2024; Breznitz and Zehavi, 2010; Shi et al., 2024). These dynamics hinder firm scale-up outside the main innovation ecosystems and reduce the potential economic spillovers mature firms could have created in the communities where they were first established. Consequently, innovative firms' economic benefits often materialize in already-developed regions and remain in the hands of a small set of founders, senior engineers, and investors (Breznitz, 2021).

These conflicting accounts leave us with an open question: does equity investment support local scale-up, or is it more likely to lead to an

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early sale or firm relocation? In this paper, we address disagreements in existing literature by exploring the conditions under which equity investors enable local scale-up. To do so, we take cues from studies investigating the relationship between investors and firm founders (Huang and Knight, 2017; Garg and Eisenhardt, 2017). These studies argue that mutual resource exchanges, expectations, and commitments between investors and founders shape startups' performance. Therefore, we study how the impact of equity investors on startups' growth outcomes is shaped by firm founders and their ability to access resources from their ecosystem.

We focus on the case of Israel's high-tech sector, which, in recent years, has produced a growing number of scale-ups (Israel Innovation Authority, 2021; Avnimelech and Amit, 2024). Building on existing literature and exploratory interviews with 26 investors, founders, and policymakers, we argue that specific types of investors, which we refer to as patient equity investors (PEIs), are particularly conducive to scale-up. However, we also suggest that backing from PEIs increases the likelihood that startups will relocate abroad, thus diminishing *local* scale-up. We propose that local scale-up is more likely than relocation in cases where PEIs invest in startups founded by entrepreneurs who are either (1) highly embedded within their eco-system or (2) have significant entrepreneurial experience. We test these claims with exponential competing risk models and endogenous treatment specification (Bertoni et al., 2011), using a unique dataset of 5689 Israeli high-tech firms from 2005 to 2020.

Our findings largely support these claims, contributing to a better understanding of how equity investors enable scale-up outside the main technological clusters. We find that PEIs were more likely to contribute to local scale-up than non-patient investors, particularly in cases where PEIs invested in highly embedded or experienced founders. Conversely, funding from non-patient equity investors increased startups' likelihood of an early sale, especially when their founders were highly embedded or experienced. Thus, our findings suggest that local scale-up results from the association of PEIs and resourceful founders. These findings contribute to the literature on the finance of entrepreneurship (Drover et al., 2017; Pahnke et al., 2015) by showing how different types of investors (PEI vs. non PEIs) and founder characteristics jointly shape the growth model startups pursue. In our discussion, we elaborate on how our results can inform policies to produce the kind of scale-ups that advance more inclusive local development.

2. Research context: Scale-up in Israel

Israel's high-tech sector is a pertinent case study for our examination. Heralded as a ‘start-up nation’, Israel is a world leader in the number of startups and venture capital (VC) investments per capita (Maggor and Frenkel, 2022). Its high-tech sector accounts for 18 % of GDP, provides almost 50 % of the country's exports, and employs more than 10 % of the working population – the highest rate in the OECD (Israel Innovation Authority, 2023). Israel's high-tech and VC sectors emerged from a state-led project that included a myriad of government programs and policies. These initiatives were also responsible for the industry's growing integration into the US market and adopting the Silicon Valley equity-backed model (Breznitz and Zehavi, 2010; Avnimelech and Teubal, 2008; Breznitz, 2007). While this process led to a staggering increase in the formation of high-tech firms, it also expanded the number of Israeli startups that either merged with foreign corporations or relocated abroad.

In recent years, however, more Israeli firms have demonstrated an ability to avoid the standard merger and acquisition (M&A) route and scale up locally (Avnimelech and Amit, 2024). Technological startups like Wix, Monday, Gong, and Fivver, to name just a few examples, have matured into global market leaders while maintaining their core operations and headquarters in Israel. Nevertheless, Israel continues to have an exceptionally high rate of startups relocating abroad (Conti and Guzman, 2023).

Below, we review the literature on equity investors and local scale-up. Next, we rely on exploratory interviews to inform the development of our research hypotheses. We proceed to present our methods, model, and findings. We conclude with a debate of our main findings, limitations, directions for future research, and main policy implications.

3. Equity investors and technological firms' different growth outcomes

Numerous studies find that equity investors can positively impact the performance of technological firms (Drover et al., 2017). This literature primarily focuses on the financial outcomes of startups and, therefore, views firm acquisition and growth as equally positive outcomes (Hellmann and Thiele, 2023). Yet, from a local or regional development vantage, startups can pursue three distinct growth outcomes with significantly different developmental consequences: (1) M&A, (2) relocation to more developed ecosystems, or (3) local scale-up.

Technological ventures are often acquired at a relatively early stage of their development in what is referred to as an M&A (Drover et al., 2017). These startups adopt a business strategy that concentrates efforts and resources on developing innovative technologies with the goal of being purchased by larger, established firms. This strategy maximizes a quick return on investment for both firm founders and investors. Since these startups focus primarily on research and product development, they tend to employ a small to medium number of workers and produce limited revenue. Consequently, the contribution of these young firms to economic development is limited (Breznitz, 2021; Shane, 2009).

Other startups relocate their core operations and headquarters to more developed ecosystems to be closer to key resources and potential clients (Weik et al., 2024; Shi et al., 2024; Conti and Guzman, 2023; Breznitz and Taylor, 2014). Regardless of whether these startups eventually fail, merge with larger firms, or scale up, the region where they were initially established loses out on the positive economic spillovers associated with firm growth (Quas et al., 2022; Breznitz and Taylor, 2014).

Finally, some startups scale up within the ecosystem where they were initially established (Breznitz, 2021; Maggor, 2021). Beyond developing novel technologies, these firms operate scalable sales, customer support, and distribution departments, hiring a diverse professional workforce, and collaborating with other firms within their ecosystem (Jansen et al., 2023; DeSantola and Gulati, 2017). Although these firms often establish additional branches worldwide, a significant share of their managerial, research and development, and customer and sales support remain in their original eco-system, and the same goes for their IP. Compared to the two outcomes outlined above, local scale-ups produce more significant economic benefits: diverse jobs, tax income, skills, and knowledge formation, as well as a springboard for future entrepreneurship (Denney et al., 2023). Therefore, from a regional development and inclusive growth perspective, this third outcome is most desirable (Berger, 2013; Breznitz, 2021; Denney et al., 2023).

Unlike the influence of equity investors on startups' financial performance, their impact on scale-ups remains ambiguous. One group of studies argues that, in some cases, equity investors, such as VCs, positively contribute to firm growth (Drover et al., 2017). These studies underscore that in addition to supplying the necessary capital, equity investors provide business guidance, connections, and high-quality personnel while closely monitoring the firms they support (Hall and Lerner, 2010). Consequently, they enable organizations to expand their workforce, sales, revenues, and assets while accelerating product commercialization (Bertoni et al., 2011; Cavallo et al., 2019; Colombo and Grilli, 2010; Hellmann and Puri, 2000).

More recently, scholars have identified the emergence of specific types of equity investors whose ‘patient’ investment model is especially favorable to firm scale-up (Rahman and Thelen, 2019; Klingler-Vidra, 2016; Deeg and Hardie, 2016). These patient equity investors (PEIs) include VCs, private equity firms, holding companies, and sovereign

wealth funds (Rahman and Thelen, 2019; Klingler-Vidra, 2016; Deeg and Hardie, 2016; Block et al., 2018; Thatcher and Vlandas, 2016). Like the mid-century form of "patient capital" (Zysman, 1983), PEIs commit to longer investment horizons with the goal of producing large and profitable firms (Deeg and Hardie, 2016; Somaya and You, 2024). However, in contrast to the mid-century form, PEIs pursue 'winner-take-all' market strategies that, if successful, often establish monopolies or near-monopoly positions (Rahman and Thelen, 2019; Kenney and Zysman, 2019).

Although there is no established definition for PEIs, existing studies have identified several shared characteristics that distinguish them from other equity investors. First, PEIs manage significantly large amounts of capital (Kenney and Zysman, 2019). Second, most patient investors seek to invest in startups in their earliest developmental stages (Klingler-Vidra, 2016). This gives investors a large equity stake and influence over ventures' strategic business decisions from an early stage. Finally, PEIs follow up with subsequent funding rounds, further demonstrating their patience and loyalty (Klingler-Vidra, 2016; Deeg and Hardie, 2016). Building on these theoretical insights, in this paper, we define PEIs as institutional investors who manage significant investment capital, make long-term investments, and tend to participate in startups' early and late-stage funding rounds.

In contrast to the literature discussed above, another group of studies argues that equity investors hinder scale-up, especially outside the core technological ecosystems such as Silicon Valley, New York, or Tokyo (Breznitz, 2021; Yao and O'Neill, 2022). These studies stress that equity investors generally commit to providing returns on their investments within a restricted timeframe (usually five-seven years) (Feldman and Kenney, 2024). Once investors approach these clear end dates, they begin pressuring founders to seek an 'exit' route, most commonly via an M&A (Yao and O'Neill, 2022; Kaplan and Schoar, 2005). Corporate equity investors (e.g., CVCs) also have little interest in encouraging scale-up. Instead, they tend to acquire the most promising startups in their portfolio for their innovative technologies or to ensure they do not become potential competitors (Dushnitsky and Lenox, 2006; Katila et al., 2008). Moreover, equity investors often encourage promising firms from non-core clusters to relocate to eco-systems with more opportunities and resources (Weik et al., 2024; Shi et al., 2024). Thus, according to these studies, equity investors essentially hinder local scale-up and regional development.

In summary, the existing literature on equity investment presents contradictory predictions. While some researchers suggest equity investors, especially PEIs, can increase the chances of scale-up, others argue that equity investors diminish scale-up.

Below, we use the case of the Israeli high-tech industry to systematically examine how equity investment shapes local scale-up.

3.1. PEIs, non-PEIs and local scale-up

To develop our main hypotheses, we rely on 26 exploratory, semi-structured interviews. We recruited our interviewees via "targeted sampling", a purposeful, systematic method designed to recruit adequate numbers of cases within each of a pre-specified sub-population (Watters and Biernacki, 1989). To obtain these sub-populations, we interviewed general partners of patient and non-patient investor funds, founders of startups that scaled, and those who experienced an M&A. To distinguish between PEIs and non-PEIs, we relied on the funds' public statements, previous investment record, and statements from the entrepreneurs we interviewed regarding their experience with these investors. After identifying the relevant funds and startups, we used LinkedIn to find and contact relevant interviewees based on their role and experience. Overall, we interviewed nine patient equity investors, three non-patient investors, seven founders of growth-oriented tech firms, and four founders of startups that experienced an M&A. To get a broader picture of the innovation ecosystem, we also interviewed three policymakers from Israel's Innovation Authority. Interviews lasted 1–2 hours, either face-to-face or on Zoom. Our interview questions focused on firm growth strategy and history, investor-founder relationships, general views regarding the Israeli innovation ecosystem, and the relevance and impact of government policy. Beyond data from our exploratory interviews, our hypotheses are also informed by the relevant scholarship on innovation, entrepreneurship, and economic development.

Our interviews suggest that PEIs are a key factor enabling scale-up in Israel. Interviewees often underscored the distinction between the long-term investment model of PEIs and the relatively short-term approach of other equity investors and its relevance for scale-up. The primary way that PEIs contribute to scale-up is by compelling founders to adopt a long-term business model. As one founder explained:

> "Once all these big [patient] investors came in, Insight, SoftBank, Tiger… If the entrepreneur says [to them], I want to [raise] $20 million… They tell him: 'forget that, explain to me how you're going to spend $100 million. $20 million is not interesting.' This was the conversation— think about how to aim higher. […] It's a certain mindset […] They're investing [to] find the next Google. Even when you don't have a big vision, [the investor] pushes you."

PEIs can shape startups' growth outcomes by injecting significant capital in multiple funding rounds and working with founders to achieve long-term growth. This motivates founders to adopt a more patient vision for their firm rather than seeking quick returns. One founder told us:

> "There are two things [PEIs provide]: First is to come and say, 'Building a company takes time. You need patience. It will take years, OK, it doesn't scare us.' The second is capital. It's a fund that you know has very, very deep pockets. And they know how to…make follow-up investments, and they [invest in] every round. The mentality is: one, we have patience, no problem, and two, we have money… everything is fine."

An important instrument that investors use to steer founders away from an early 'exit' is the provision of a 'secondary round' whereby investors either purchase a portion of founders' equity shares or permit them to sell shares to third-party investors in return for a large cash payment (Klingler-Vidra, 2016). This additional source of income diminishes the pressure on founders to pursue short-term goals that hinder scale-up. As one patient investor explained:

> "I often tell founders: You have a once-in-a-lifetime opportunity to take it all the way. Don't sell now for $700 million. Let's turn it into a $4 billion business. So take a five million secondary funding so you can buy that house you want… take a nanny for the kids, and let's build a business. You will make $150 million later. This calms the whole system and enables them to work and focus on the firms' true potential to grow."

In contrast to PEIs, non-PEIs were focused on making the firms they backed attractive to potential buyers in order to reach a valuable M&A deal as quickly as possible. As one founder told us:

> "[non-patient] funds are very bad [for growth]. Their [investment] mindset is that of a 'sprint'. They have very low financial capacity to see companies develop […]. Companies [they invested in] are programmed to: raise money, create value very, very quickly, sell, and off to the next [venture]."

Other founders highlighted non-PEI's short-termism and unwillingness to face scale-up challenges:

> "[non-patient] funds are reluctant to spend money. They are always stressed out, and when there are hard times, they panic."

In sum, our interviews suggest that PEIs motivate startups to aim for scale-up rather than search for a relatively early M&A, and enable them to pursue this direction. We therefore hypothesize that:

Hypothesis 1. Funding by PEIs decreases the likelihood of M&A, compared to startups funded only by non-PEIs.

While our interviews suggest PEIs induce founders to adopt a scale-up vision, this does not mean they necessarily encourage *local* scale-up. Equity investors frequently motivate and sometimes require their firms to relocate near them or to eco-systems where they would enjoy more access to capital and other essential growth resources (Weik et al., 2024; Breznitz and Zehavi, 2010; Shi et al., 2024). The pressure to relocate that investors exert also came up in our interviews. Because PEIs tend to make significant, early-stage investments and are more involved in shaping business strategy, their influence on founders' relocation decisions is likely to be more prominent than other equity investors (Garg, 2020; Garg and Furr, 2017). One founder backed by PEIs explained:

> "The investors tell you, 'Congratulations, [you raised] round A! Now, when are you moving to the US?' You know from the beginning how this path, if it continues, will look."

Another founder said:

> "There is often a demand from […] investors to move the firm's headquarters abroad. Because they believe it is necessary to be closer to the market […] that it's necessary to be on the ground."

Indeed, PEIs were often concerned that the Israeli ecosystem lacked the resources and know-how to pursue local scale-up. For example, one equity biotech investor explained why most of the Israeli startups his fund invests in end up relocating to scale up in the US:

> "Israel doesn't have the infrastructure for [scale-up] in biotech. There isn't enough money […] there isn't the human capital that knows how to develop medicines […], and you don't have a hub for production. There's no ecosystem."

Thus, while our interviews suggest that funding from PEIs increases startups' ability and motivation to scale, they also show that, in some cases, PEIs can also encourage founders to relocate and scale outside the region where their startup was initially established, thus decreasing the likelihood of *local* scale-up.

Therefore, we hypothesize that:

Hypothesis 2. Funding by PEIs increases the likelihood of both local scale-up and firm relocation, compared to startups funded only by non-PEIs.

3.2. Contribution of entrepreneurs' ecosystem embeddedness and experience to local scale-up

Given the ambiguous impact of PEIs on startups' growth outcomes, under what conditions do firms that receive PEI investment scale up locally rather than relocate? In their formative statement, Huang and Knight (Huang and Knight, 2017) argue that the influence of investors depends on their relationship with the firm's founders. Specifically, they stress that the quality of founders' resources and experience shapes investors' commitment, resulting in different growth trajectories. Others argue that founders with access to organizational expertise and technological knowledge are less dependent on their investors and, therefore, have more influence on firm outcomes (Garg and Eisenhardt, 2017; Garg, 2020; Garg and Furr, 2017; Devarakonda et al., 2022). Thus, the impact of investors on startups' growth outcomes should be shaped by the degree of founders' access to growth resources. Accordingly, we suggest that two founder characteristics moderate the influence of investors on firms' growth trajectory: 'ecosystem embeddedness' and 'entrepreneurial experience.'

Founders' ecosystem embeddedness is the degree to which founders are integrated within the social networks of their local ecosystem (Moody and White, 2003). Founders with a central position within their ecosystem have more access to knowledge, resources, investors, and skilled employees than marginally positioned founders (Florin et al., 2003; Higgins and Gulati, 2006; Macpherson and Holt, 2007). Highly embedded founders are, therefore, more reliant on and committed to their local ecosystem than less-embedded founders (Dahl and Sorenson, 2009; Larsson et al., 2017; Stam, 2007). Consequently, the more embedded founders are, the less likely they are to relocate their startups abroad.

Startups backed by PEIs should be more likely to scale up locally when they are managed by highly embedded founders in comparison to startups with marginal founders. Because PEIs motivate founders to adopt a long-term business model, highly embedded founders are more likely to use their independent resources to develop the organizational structures necessary for scale-up. This should increase their ability to scale up and reduce PEI's reservations concerning the aptitude of the local ecosystem. Because they enjoy access to key resources, highly embedded founders should also be better positioned to withstand PEIs' pressures to relocate than less embedded ones (Devarakonda et al., 2022) and are therefore more likely to achieve local scale-up. As one founder who scaled up locally explained:

> "All my contacts are here, all my resources are here. It makes no sense for both me and my investors that I move [the startup] somewhere else. Here, I can make this business work."

Conversely, when startups are funded by non-PEIs, an increase in founders' embeddedness should not increase startups' likelihood for local scale-up. Non-PEIs encourage founders to maximize short-term value and most often do not provide the financial and organizational resources required for scaling up. Therefore, in startups funded only by non-PEIs, the resources that founders can muster from their industry position would be applied mainly for product development and increasing firm value. Thus, we hypothesize:

Hypothesis 3a. Increases in founders' embeddedness decrease the likelihood of relocation among both PEI and non-PEI-funded startups.

Hypothesis 3b. Increases in founders' embeddedness increase the likelihood of local scale-up among PEI-funded startups while decreasing it for non-PEI-funded startups.

A second attribute that should moderate the effect of PEIs on a firm's growth outcome is the number of firms that founders have previously established. Serial entrepreneurs are more proficient in addressing the challenges facing young ventures, can better identify viable opportunities, and are more likely to raise capital when compared to less experienced entrepreneurs (Baron and Ensley, 2006; Delmar and Shane, 2006; Hsu, 2007; Lafontaine and Shaw, 2016). Experienced founders' accumulated knowledge and capabilities can assist them in areas where their investors are less knowledgeable. Because they have experience cooperating with investors, these founders can make the most out of the resources and advice PEIs provide (Garg and Eisenhardt, 2017). Moreover, serial entrepreneurs should be more motivated and better able to resist investors' pressures to relocate. Experienced founders are more familiar with their local ecosystem, making it easier for them to develop their ventures within the ecosystem than outside of it (Lafontaine and Shaw, 2016; Gompers et al., 2010), and have more confidence to challenge their investors (Garg and Eisenhardt, 2017). As one PEI investor said:

> "It's all about power. Investors always want firms to get closer [to them], but experienced entrepreneurs can challenge that, and insist on staying close to their families and living a normal life. Experienced entrepreneurs know what they need, and they know how to get it from their investors without giving up too much."

Consequently, startups with PEI investment should be more likely to scale up when their founders are experienced entrepreneurs, in contrast to those with less experience.

Formally, we hypothesize:

Hypothesis 4a. Increases in founders' experience decrease the

likelihood of relocation among both PEI and non-PEI funded startups.

Hypothesis 4b. Increases in founders' experience increase the likelihood of local scale-up among PEI-funded startups while decreasing it for non-PEI-funded startups.

4. Method

We tested our hypotheses using unique data on high-tech firms founded in Israel from 2005 to 2020. The data were compiled by IVC, the leading business information provider on Israel's high-tech industry. We refrained from including data after 2020 because of the impact of the COVID-19 pandemic on the global economy and the Israeli high-tech sector. We limited our sample to firms that raised external funding to omit firms that were not promising enough to attract investments. Our sample contained 5110 firms and 6792 equity investors operating in various technological sectors, including business software, gaming, commerce, social media, finance, semiconductors, agriculture, internet and mobile infrastructure, hardware, and defense.

4.1. Key Variables

Unless stated otherwise, all variables are time-varying and lagged by one year prior to the dependent variable.

4.1.1. Firm growth outcomes

Our dependent variable identifies four possible firm growth outcomes: local scale-up, M&A, relocation abroad, and liquidation. There is no agreed definition or measure for the concept of 'scale-up' (Coad et al., 2024; Coviello et al., 2024). Still, scholars have emphasized that scale-up is distinct from high-growth and represents a specific stage in a firm's development trajectory (Jansen et al., 2023). Accordingly, we used the IVC's 'company stages and status' indicator, which ranks each firm's stage of development starting from 'seed,' 'research and development,' 'initial revenue,' to the most advanced 'revenue growth.' The latter category is defined as 'a company whose yearly revenues exceed $10 million and has a double-digit yearly growth rate.' For the large majority of our cases, the IVC's 'company stages and status' indicator was updated annually. For the 42 startups for which this was not the case, we inputted missing data from Startup Nation Central's 'Finder' dataset, which uses similar measures as the IVC. Using this data, we identified local scale-ups as firms that achieve 'revenue growth', were not acquired, and are headquartered in Israel, the latter indicating the firm's core business and management remain embedded within the local economy (Weik et al., 2024).

This definition was compelling for our purposes for two reasons. First, it allowed us to identify scale-ups as firms that have commercialized their products. Thus, while our classification is compatible with the widely used OECD definition of scale-ups[2], it goes beyond a narrow focus on growth rate to capture a distinct advanced stage in firms' maturation. Second, this definition is commonly used by Israeli policy experts to distinguish mature firms within the Israeli ecosystem (Israel Innovation Authority, 2021).

We identified firms that experienced M&A with either a local or foreign firm as 'M&A'. Following previous studies (Weik et al., 2024), we defined the outcome of firms moving their HQ abroad and not merging with other firms as 'relocation'. Firms shutting down without achieving any of these three outcomes were identified as 'liquidated'. Overall, we identified 121 scale-ups, 562 M&As, 611 relocations (that were not subsequently acquired or liquidated), and 1504 liquidations. Firms that had not experienced these events by 2020 were coded zero.

[2] The OECD defines scale-up as 'an enterprise with average annualized growth greater than 20 % per annum, over a three-year period, and with ten or more employees at the beginning of the observation period'.

4.1.2. PEIs

As outlined above, previous research identified PEIs as large investors who tend to make both early and late-stage investments. Because we do not have data on investors' business models, nor do we know of any source that does, we constructed an original variable that distinguishes between PEIs and non-PEIs based on the definition proposed by previous studies. We defined PEIs as investors that (1) raised a fund of over $300 million, (2) made at least one Seed, Round A, or Round B investment, commonly considered as early-stage funding (Klingler-Vidra, 2016; Gompers, 2022), and (3) followed up on that investment in late-stage investments in the same startup. Once an investor presented these three conditions at least once, we classified it as a PEI in the following years in our data. Otherwise, it was categorized as non-patient. We selected the $300 million benchmark because it identifies a unique category of very large investors. This is illustrated in Fig. 1, which plots the distribution of investors' fund size. Lowering the benchmark to 100 million did not change the number of PEIs we identified in our data.

Overall, we identified 65 PEIs, representing 2.7 % of the equity investors in our data. Sixty-three of these PEIs presented a patient investment pattern more than once. Each of these PEIs participated in the early investment rounds of over 70 % of the startups they backed. As indicated by previous studies (Block et al., 2018), PEIs in our data included large VCs, investment firms, and private equity funds.

While our decision to categorize investors as PEIs when they meet our three criteria even once might initially seem like a low bar to pass, it is crucial to remember that most startups fail to mature, notwithstanding the motivations and interests of their investors. Therefore, even when PEIs are interested in long-term growth, they will never be able to make follow-up investments in all the firms in which they made an early investment. In other words, expecting all actual investments to resemble the ideal patient investment pattern is impossible. Thus, our approach enables us to gauge investors who have pursued a patient strategy at least once and therefore should be viewed as PEIs. Moreover, using the $300 million benchmark enabled us to distinguish between investors who aspire to make patient investments and 'free-rider' investors who continue investing in a successful startup but are not necessarily patient themselves. While the former can make large follow-up investments, the latter do not have sufficient capital to pursue patient investments systematically.

To demonstrate the distinction between PEIs and non-PEIs, we compare in Table 1 key attributes of these funds. Because PEIs were defined through the size of their largest fund, it is not surprising that, on average, their funds are much larger than those of non-PEIs. However, it should be noted that non-PEIs also include 47 equity investors that raised funds larger than 300 million dollars. This is reflected in the large standard deviation in fund size among non-PEIs. These large investors are not considered patient because, per our proposed definition, they did

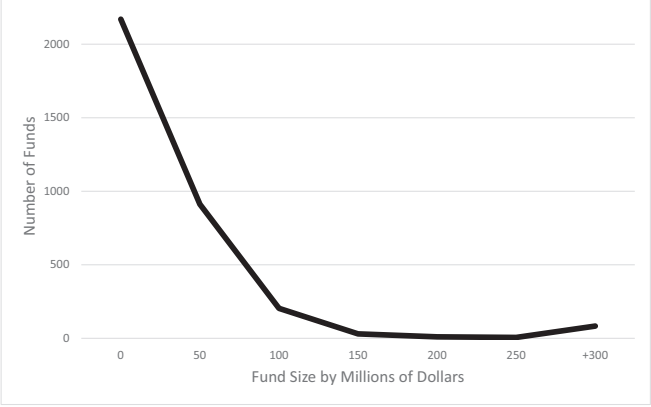

Fig. 1. Distribution of equity investors' fund Size.

Table 1
PEIs and non-PEIs Characteristics.

	PEIs		Non-PEIs	
	Mean	S.D.	Mean	S.D.
Largest fund (in million $)	443.3	56.7	68.4	314.78
Proportion of late-stage investments	0.37	0.08	0.18	0.41
Portfolio size (# of total investments)	56	29	57	38
Network Centrality	2.44	2.05	7.45	8.39

not make early-stage investments but primarily focused on late-stage funding.

Table 1 also indicates that the PEIs we identified have a more homogenous investment pattern than non-PEIs. Most PEIs made about 37 % of their investments in late-stage funding (round D and onwards), which results in a low standard deviation of 0.08. Conversely, non-PEIs include investors who made more than 60 % of their funds on late-stage investments, and others who did not participate in late-stage funding. Consequently, for non-PEIs, the mean proportion of late-stage investment deals is much lower relative to PEIs (18 %), while the standard deviation is much larger (0.41). Finally, Table 1 indicates that although PEIs and non-PEIs make a similar number of investments on average (portfolio size), non-PEIs enjoy greater status when compared with PEIs, as represented by their network centrality (more on this measure below). Taken together, these data suggest that, rather than financial abilities or status, our measure of PEIs mainly captures these funds' distinct investment strategy. We accounted for the variables presented in Table 1 in our models.

We were also concerned that we misidentified PEIs as non-patient because some of their investments were unsuccessful or because they made only one patient investment in Israel. We explore these issues in detail in our robustness tests section below.

Based on this definition, we constructed a dummy variable in which once a startup received funding from a PEI, it was coded as 1. If it was backed only by non-PEIs, it was coded zero. We experimented with models that included variables measuring the number or proportion of PEIs. The results were comparable to those presented below.

4.1.3. Entrepreneurs' ecosystem embeddedness

To capture founders' ecosystem embeddedness, we constructed yearly industry networks based on a moving time window that included all founders and investors active in the industry in the previous three years. Ties in these networks represented founders who established a firm together, as well as their investors.

We measured embeddedness with Moody and White's (Moody and White, 2003) measure of structural cohesion. This algorithm was the most appropriate measure of embeddedness for our purposes because it captured founders' integration within the ecosystem. The method identifies hierarchically embedded subsets of nodes (e.g., founders and investors) by iteratively: (1) identifying the nodes connected by the least number of ties to the rest of the community and (2) removing them, creating a more cohesive subset. We then identified the level in which founders were positioned: Founders who were part of the sub-graph with the least cohesiveness were given a value of one; those at the next level were given a value of two, and so on. Isolated founders received a zero.

Because yearly networks differed in the number of sub-graphs, we measured founders' embeddedness by dividing the hierarchical level at which they were positioned by the total number of hierarchical levels in the network. For example, in a yearly network with ten subsets, founders' embeddedness in the most cohesive set was calculated as ten divided by ten. The embeddedness of the least integrated founders equaled one divided by ten. A founder who was part of the tenth subset in a year containing 12 subsets had a higher embeddedness measure. Thus, our measure of embeddedness ranged from zero to one.

If founders' embeddedness is shaped by their investors' ties, it might not be an alternative source of resources that founders can rely on. We therefore measured founders' embeddedness in the year their startup was founded. We also explored models where founders' embeddedness was updated yearly. The results were almost identical. Firms with more than one founder received the embeddedness of their most embedded founder.

4.1.4. Number of firms previously established by founders

We calculated the number of firms previously established by the firm founder who established the most firms. We also experimented with using the sum of firms previously established by all founding team members. The correlation between this variable and founders' ecosystem embeddedness was 0.15, implying that while these variables are associated, they capture different entrepreneurial attributes. One example of this distinction is novice founders with a background in military intelligence or a technological unit, which afforded them valuable industry ties and were, therefore, highly embedded.

4.1.5. Control Variables

Firms attracting more investors may have a more promising product, thus increasing the likelihood of scale-up. Therefore, we accounted for the *number of firms' funding rounds* and the *number of investors*. Because pressures to sell increase as firms' funds are depleted (Yao and O'Neill, 2022), we controlled for the *number of years since the last funding round*. Since firm growth is highly influenced by the ability of firms to acquire other organizations, we accounted for the *number of firms acquired*. We accounted for ventures' *year of establishment* and created dummy variables for their *sector of activity*, as this can influence ventures' opportunities and organizational goals. We also accounted for whether firms *received government funding*.

We included several variables to capture investors' characteristics. To account for investors' activity levels, access to information channels, and status, we controlled for the *size of investors' portfolios* (representing the number of total investments) and the *power centrality* in the industry networks of the most central among the equity investors (for a similar approach, see (Pollock et al., 2015)). We control whether a startup was funded by a *foreign* investor or a *CVC* because these investors tend to increase the likelihood that startups relocate or experience an M&A, respectively. We also controlled for startups that were *funded only by angel investors*.

We accounted for the ability and experience of startup founders by controlling for the founder with the highest *industry tenure* and the founder with the highest *number of exit events* (M&A or IPO). Founders' experience within the sector has both positive and negative impacts on growth (Eesley and Roberts, 2012). Thus, we calculated founders' past *sector diversity* by averaging the inverse Herfindahl-Hirschman index of all founders:

$$Diverstiy = 1 - \sum_{p=1}^{N} p_g^2$$

where p_g is the proportion of sector g founders who were active in, and N is the total number of sectors. Finally, we controlled for the *number of firm founders*.

We included year fixed-effects to account for regulatory changes or fluctuations in the global economic environment. Table 2 presents descriptive statistics and correlations of all variables.

4.2. Modeling

To test Hypothesis 1, we modeled the likelihood of startups' M&A or liquidation using exponential competing risk models (Beyersmann et al., 2011). These models resemble exponential event-history models but allow multiple eventual outcomes by estimating the effect of covariates in the presence of competing events (Kleinbaum and Klein, 2012). Our unit of analysis was the firm-year. These models are appropriate for our purposes for several reasons. First, ventures can be sold or liquidated at

Table 2
Descriptive Statistics and Correlations.

	Mean	SD.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Backed by PEIs	0.06	0.37																		
2. Founders' embeddedness	0.19	0.17	0.02																	
3. Founders' max # firms established	0.78	2.6	0.09	0.18																
4. Number funding rounds	2.00	1.42	0.11	0.07	0.07															
5. Number of investors	4.00	1.70	0.03	−0.02	0.23	0.24														
6. Number of years since last funding	2	2.3	0.01	0.00	0.00	−0.02	−0.04													
7. Received state funding	0.16	0.36	−0.16	−0.02	−0.06	−0.11	−0.17	0.00												
8. Number firms acquired	0.1	0.73	0.14	0.00	0.00	0.27	0.38	0.01	−0.16											
9. Investor max total capital (in billions)	23	7.2	0.24	0.15	0.10	0.11	0.05	−0.09	−0.15	0.09										
10. Investors' mean portfolio size	53	39	0.09	0.07	0.12	0.16	0.03	−0.13	−0.12	0.18	0.27									
11. Investor % of late-stage investments	19	0.27	0.21	0.01	0.09	0.13	0.15	0.00	0.08	0.17	0.24	0.02								
12. Investors' max industry centrality	5.77	7.34	0.07	0.11	0.00	0.01	0.14	−0.09	−0.01	0.00	0.09	0.09	0.00							
13. Foreign investors	0.27	0.32	0.18	0.13	0.01	0.12	0.11	0.00	0.03	0.17	0.11	0.15	0.00	0.00						
14. CVC	0.17	0.26	−0.19	−0.01	0.02	−0.04	−0.04	0.11	0.00	0.04	0.13	0.02	−0.03	−0.08	0.31					
15. Funded only by angel investors	0.09	0.13	−0.13	−0.05	−0.15	−0.32	−0.42	0.29	0.04	−0.47	−0.27	−0.17	−0.37	−0.21	−0.17	−0.87				
16. Founders' industry tenure	6.45	5.72	0.03	0.05	0.17	0.01	0.12	−0.02	−0.02	0.00	0.10	0.19	0.07	0.23	0.00	0.00	−0.19			
17. Founders' max # successful firms	0.25	1.7	−0.01	0.00	0.08	0.00	0.00	−0.07	0.01	0.01	0.03	0.00	−0.02	0.03	0.13	0.00	−0.27	0.01		
18. Founders' sector diversity	0.24	0.6	0.05	0.12	0.00	−0.10	0.00	0.00	0.09	0.00	−0.02	−0.01	0.00	0.02	0.01	0.09	0.00	−0.10	−0.05	
19. Number of founders	2.4	0.7	0.01	0.19	0.03	0.00	0.09	−0.09	0.00	−0.12	0.04	0.11	0.00	0.08	0.00	−0.02	0.00	0.00	−0.01	0.03

any point in their development, and these outcomes are influenced by the startups' situation at each point in time (Bertoni et al., 2011; Weik et al., 2024). Risk models account for this temporal dependency in the firm development stage by comparing ventures with the same tenure rather than between all firms in the data. Second, exponential risk models allow a more flexible baseline hazard rate, which does not assume a unified firm development process. Third, by accounting for right-side censorship, they enable the inclusion of firms that did not achieve any of the growth outcomes until 2020, thus attenuating selection bias issues.

To test Hypotheses 2–4, we used exponential competing risk models that explore the likelihood that startups that continued to grow relocated abroad or scaled up locally. Therefore, in these models, we excluded startups that experienced an M&A or were liquidated. To attenuate selection issues, we included the survival estimations of startups from the previous model as an inverse Mills' ratio variable in these models.

5. Results

To illustrate equity investors' impact on firms' growth, Fig. 2 presents the cumulative rate of startups that experienced an M&A as a function of their tenure, comparing startups with PEI funding to those with funding from non-PEIs only. The cumulative probability of an M&A for startups with no PEI funding increased gradually by tenure. In contrast, for startups with PEI backing, the probability of an M&A was less than 2 % for young firms and began increasing only seven years after the firm was founded. This suggests that startups with PEI funding delayed an M&A longer than startups without PEI investment. These results also indicate that PEIs do not avoid M&As at all costs and continue to view this outcome as a viable option.

Table 3 explores our predictions in Hypothesis 1 that investment from PEIs decreases the likelihood that startups experience an M&A compared to startups that PEIs did not support. The table presents exponential competing risk models of whether startups experienced an M&A or were liquidated. Supporting H1, the results indicate that startups that received funding from PEIs were 61 % less likely (1-exp (−0.96)) to experience an M&A compared with firms funded only by non-PEIs. Notably, the likelihood of startups backed by PEIs to liquidate was higher than that of startups not financed by PEIs. This suggests that PEIs are not better at identifying successful startups than non-PEIs. It could also imply that because PEIs seek firms with the potential to become global champions, they adopt a "win big or lose big" model, therefore taking greater risks than other investors.

Table 4 presents exponential competing risk models of whether startups scaled up locally or relocated abroad. These models include only firms that still existed by 2020, which is the last year included in our data. Model 1 tests hypothesis 2 that while investment from PEIs increases the likelihood that startups scale up locally, it also increases the likelihood they relocate abroad. The results indicate that receiving funding from PEIs increased the likelihood of local scale-up by 363 % (=exp.(1.29)) compared to startups backed by non-PEIs. Backing from PEIs also increased the likelihood that a startup relocated abroad by 241 % (=exp.(0.88)) compared to startups that were not backed by PEIs. Thus, our results support H2.

We also find that increases in founders' embeddedness reduced the likelihood that startups relocated abroad and increased the likelihood that they scaled up locally. Increases in founders' experience were not associated with relocation, while increasing the likelihood of local scale-up.

In sum, our results suggest that PEIs have a mixed impact on local scale-up. PEIs increase the probability that startups they fund will continue growing rather than pursue an early M&A. However, they also increase the likelihood that startups relocate outside their original ecosystem. To better understand the impact of PEIs on local scale-up, we explore how founders' characteristics condition the effects of equity

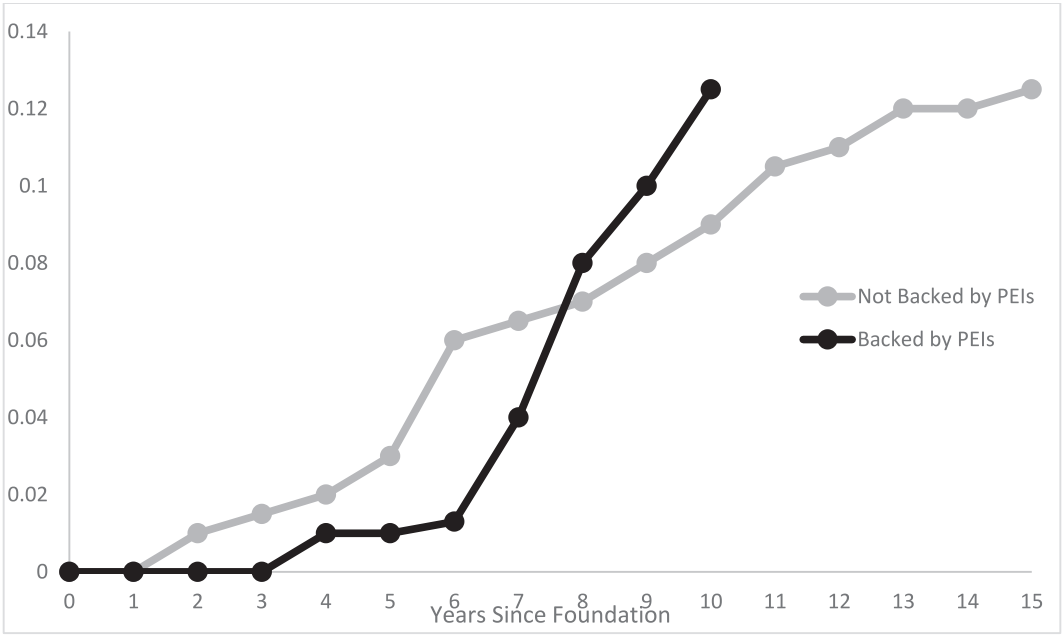

Fig. 2. Cumulative Rates of Startups M&A by Years.

Table 3
Competing Risk Models of Startup M&A.

	M&A	Liquidated
Intercept	0.17	0.23***
Backed by PEIs	−0.96***	0.09*
Firms' attributes		
Number funding rounds	0.41***	−0.53***
Number of investors	0.12*	−0.24***
Number of years since last funding	0.21***	0.17***
Number firms acquired	−0.03*	−0.21**
Received state funding	0.19**	0.09*
Year of establishment (fixed effect)	✓	✓
Product sector (fixed effect)	✓	✓
Investors' attributes		
Max total capital	0.19**	0.07
Mean portfolio size	0.13*	0.00
Percentage of late-stage investments	0.15**	−0.26**
Max industry centrality	0.01	−0.04
Foreign	0.04	0.02
CVCs	1.89***	1.03*
Funded only by angel investors	−1.65***	2.67***
Founders' attributes		
Founders' embeddedness	0.03*	−0.24**
Founders max # firms established	0.03***	−0.11*
Industry tenure	0.32**	0.16*
Max number of successful firms	0.17*	−0.21**
Sector diversity	0.00	0.07
Number founders	0.00	0.00
Year fix effects	✓	✓
Log pseudolikelihood	−812.328	−800.021
N cases	33,158	
Number of Firms	5110	

investors.

5.1. Moderating Effects of Founders' Attributes

Model 2, presented in Table 4, tests the predictions of Hypotheses 3 and 4, according to which founders' eco-system embeddedness and experience are likely to moderate investors' influence on startups' growth outcomes. We find that the interactions between founders' ecosystem embeddedness, number of firms established, and PEI funding are statistically significant. To better understand how founders' embeddedness and experience shape the impact of investors, we plotted the results of these interactions.

Fig. 3 presents the marginal effects of ecosystem embeddedness on local scale-up and relocation of startups with PEI funding (designated in a solid line) and those without (dash-dot line). The interaction results are statistically significant for the middle of the founders' embeddedness distribution, where most cases are concentrated. Focusing first on the likelihood of local scale-up, we see that, in cases where firms were backed by PEIs, the more embedded their founders were, the more likely they were to scale up locally. Conversely, when PEI invested in startups with peripheral founders, they exhibited a lower likelihood of scaling up. Importantly, startups lacking PEI funding were unlikely to scale up locally, even when their founders were highly embedded. Thus, our results confirm Hypothesis 3b.

In the case of relocation, as predicted by Hypothesis 3a, increases in founders' embeddedness decreased the probability that startups relocated abroad, regardless of their investor type. PEI-funded startups with peripheral founders were more likely to relocate abroad than startups that did not receive funding from PEIs.

We find similar patterns for the interaction effects between founders' experience and PEIs on startups' growth outcomes, presented in Fig. 4. Again, the results are statistically significant for the middle range of the founders' experience distribution, including most cases. Supporting hypothesis 4b, for startups with PEI funding, increases in the number of firms' founders previously established increased the likelihood that startups with PEI funding scaled up locally. Similar increases in founders' experience had little impact on the probability that startups without PEI funding would scale up locally. Conversely, increases in founders' experience decreased the probability that startups with PEI funding relocated, which only partially supports hypothesis 4a.

Taken together, the results suggest that when PEIs support startups founded by peripheral or less experienced founders, these startups were more likely to relocate than scale up locally. Conversely, when PEIs invested in startups with more embedded or experienced founders, these startups were more likely to scale up locally. These results imply that PEI investment is a necessary, albeit insufficient, condition for local scale-up. The same is true for highly embedded and experienced founders, as both are unlikely to produce local scale-up without backing from PEIs.

Table 4
Competing Risk Models of Startup Relocation or Scaleup.

	1		2	
	Relocated Abroad	Scaled-up Locally	Relocated Abroad	Scaled-up Locally
Intercept	1.17**	0.37*	0.07**	0.00
Backed by PEIs	0.88***	1.29***	0.13***	−0.08**
Founders' embeddedness	−0.17**	0.02**	−0.02**	0.03*
Founders' max **# firms established**	0.00	0.02*	0.01	0.01
PEIs* embeddedness			−0.05**	0.03**
PEIs* # firms established			−0.02**	0.02**
Firms' attributes				
Number funding rounds	−0.11*	0.09	−0.11*	0.10
Number of investors	0.04	0.01	0.04	0.00
Number of years since last funding	0.03	−0.21***	0.04	−0.22***
Number firms acquired	−0.03*	0.13**	−0.03*	0.13**
Received state funding	−0.11**	0.05	−0.11**	0.05
Year of establishment (fixed effect)	✓	✓	✓	✓
Product sector (fixed effect)	✓	✓	✓	✓
Investors' attributes				
Max total capital	0.10*	−0.04	0.11*	−0.04
Mean portfolio size	−0.00	0.01	−0.01	−0.00
Percentage of late-stage investments	0.06	0.01	0.06	0.00
Max industry centrality	0.06	−0.03	0.06	−0.03
Foreign	0.09*	−0.17**	0.09*	−0.17**
CVCs	−1.61***	−1.71***	−1.61***	−1.70***
Funded only by angel investors	−2.16***	−3.94***	−2.16***	−3.95***
Founders' attributes				
Industry tenure	−0.05**	0.02	−0.05	0.03
Max number of successful firms	0.00	0.00	0.00	0.00
Sector diversity	−0.01	−0.04	−0.01	−0.04
Number founders	0.00	0.00	0.00	0.00
Inclusion probability	−0.02	0.01	−0.01	0.01
Year fix effects	✓	✓	✓	✓
Log pseudolikelihood	−788.348	−747.556	−771.123	−738.812
Number of cases	18,571			
Number of firms	3044			

* Note: Models include only firms that were not acquired or liquidated.

5.2. Robustness tests

Our modeling approach assumes that founders first decide whether to adopt a scale-up model or instead pursue a quick 'exist' via an M&A. Then, only those who have adopted scale-up decide whether they should do so locally or by relocating abroad. However, these decisions may not have such clear sequencing (Bertoni et al., 2011; Weik et al., 2024). Therefore, we explored exponential competing risk models where our dependent variable includes all four growth outcomes. Furthermore, to test whether investors really do influence firms' scale-up rather than select those most likely to scale-up, we used a two-step approach. In the first step, we calculated the probability that ventures obtained funding from PEIs in year t by estimating a semi-parametric survival model, including all ventures and founders' control variables. In the second step, we included these probabilities as an inverse Mills' ratio variable in our original competing risk model. These analyses present similar results to our main models and corroborate our theoretical claims [See Appendix 1].

We addressed the challenges raised by our PEI identification strategy in several ways. First, we tested whether large investors that we identified as PEIs were already patient before we identified them as such. We identified twelve large investors that had already invested in Israeli startups previous to the year we identified them as PEIs. Classifying these prior investments as patient had no effect on our results.

Second, we re-classified nine investors who managed a fund of more than $300 million and had made an early investment but did not continue to invest in later stages as PEIs. We find that categorizing these investors as PEIs considerably reduced the direct effect of PEIs, and the interactions we explored. This reinforces our definition according to which large investors that do not invest in later stages should not be considered patient.

Third, we narrowed the definition of early investment in our operationalization of PEIs to only include seed and round A investments. This reduced the number of PEIs in our data from 65 to 58 but did not change the overall results.

Finally, we were concerned about the impact of the timing of PEIs' investment. Our theoretical framework suggests that when PEIs invest in the early stages of a startup's existence, their effects on its growth outcomes are stronger. To explore this issue, we interacted the PEI dummy with a variable identifying the year in a startup's tenure when the PEI invested in it. The results suggest that the later a PEI invests in a startup, the smaller its impact on the firm's growth outcome is relative to startups with no PEI investment. However, because most of the investments made by PEIs occurred in early rounds, the effects of this interaction were not statistically significant.

We also explored whether our classification of investors as PEIs or non-PEIs overlooked important differences due to their organizational form. We tested this by replacing our PEI dummy in the models with dummy variables for each investor type (VCs, private equity, hedge funds, etc.). The results indicate that investor type was not statistically associated with local scale-up, rather than an M&A or relocation. This further suggests that PEIs have a distinct business model that is not reduced to a particular organizational form.

6. Discussion

This paper makes several contributions to our understanding of the relationship between equity investors and firm scale-up, especially in non-core eco-systems. First, previous studies have established the key contribution of equity investors to technological startups' growth rates and financial outcomes (Drover et al., 2017). However, to date, studies have not investigated how equity investors influence startups' ability to scale into mature firms. This is a striking gap given the importance of scale-ups to local economic development (Breznitz, 2021; Denney et al., 2023) and arguments that equity investors hinder scale-up (Breznitz, 2021; Weik et al., 2024; Yao and O'Neill, 2022). Our results show that equity investors who adopted a patient investment model increased the likelihood of scale-up. Conversely, investment solely from non-patient investors increased the probability that startups were sold via an M&A. Moreover, our results show that increases in founders' resources and experience do not necessarily assure scale-up. Highly embedded and experienced founders were more likely to scale up when they were backed by PEIs. Otherwise, these resourceful founders were more likely to take their firms to an early sale. Thus, our results suggest that equity investment can contribute to local scale-up but only when these investors adopt a patient, long-term investment strategy.

Second, our results also underscore the negative impact that PEIs can have on local development in non-core innovation clusters. We find that backing from PEIs increased the probability that startups relocated their headquarters abroad. This suggests that while PEIs may motivate startups to scale, they do not necessarily motivate them to do so within the eco-system in which they were first established. This is because PEIs may believe non-core eco-systems lack the resources required for scale-up. Therefore, they compel the startups they back to relocate to more

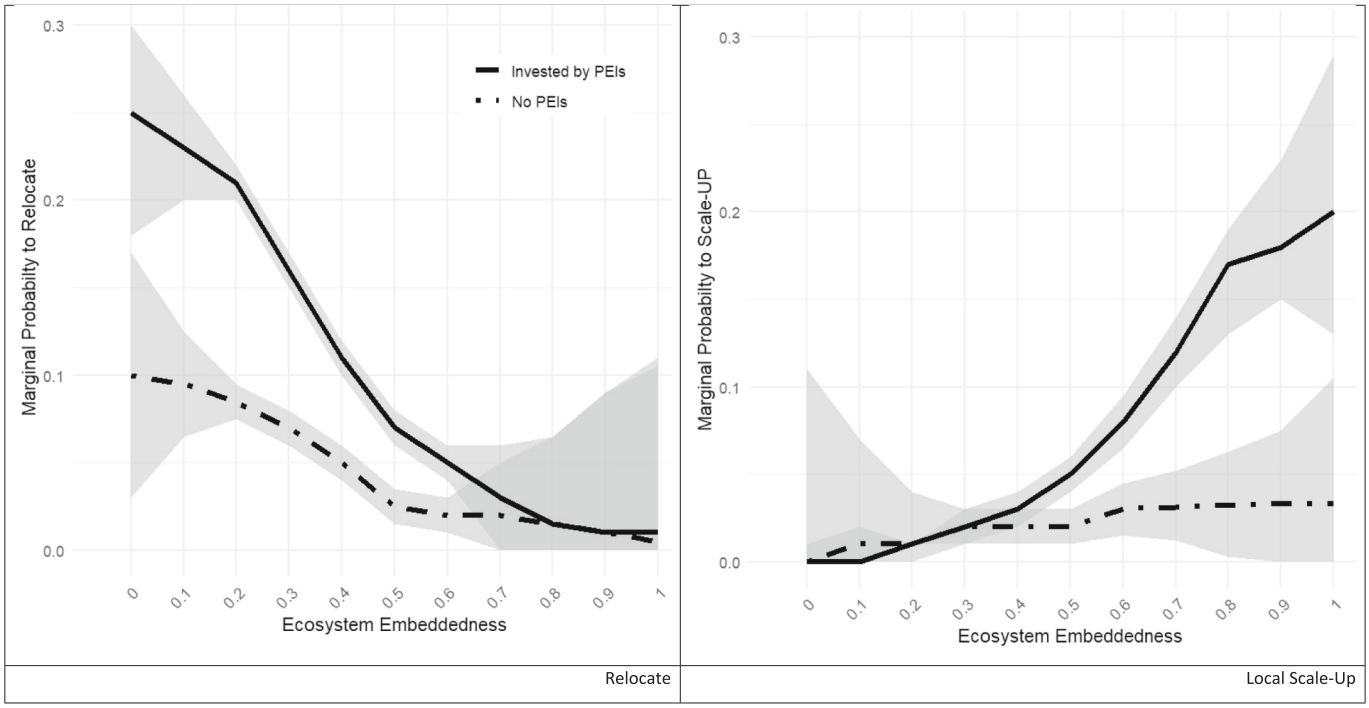

Fig. 3. The Effect of Founders' Ecosystem Embeddedness on Firm Trajectory by Type of Investor.

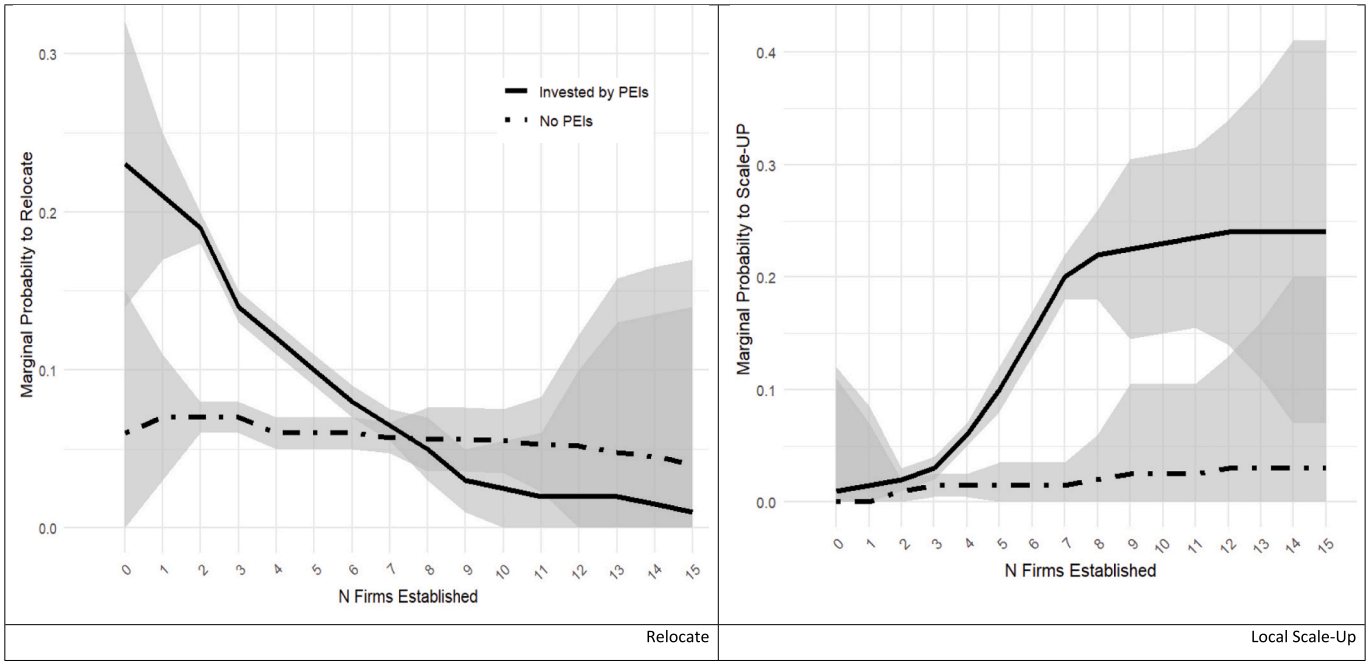

Fig. 4. The Effect of Founders' Experience on Firm Trajectory by Type of Investor.

developed and resourceful ecosystems. Consequently, PEIs' business model may be disadvantageous for local economic development, especially for non-core technological ecosystems, causing such clusters to lose out on the potential benefits of their most promising firms.

Finally, existing studies on equity investors' role in economic development largely focus on investors' direct impact on startups' growth outcomes (Breznitz, 2021; Quas et al., 2022; Feldman and Kenney, 2024). In this study, we suggest that the effects of investors are moderated by founders' access to resources and experience. Our results indicate that startups that are backed by PEIs are more likely to scale up locally rather than relocate abroad or M&A when their founders are highly embedded within eco-system networks or have previously established multiple startups. Conversely, when PEIs back founders who hold a marginal network position or lack entrepreneurial experience, their startups are more likely to relocate or be sold.

Thus, our findings provide a nuanced understanding of how equity investors shape the economic development of innovation ecosystems. While PEIs can play a positive role in forming local scale-ups, this outcome is highly dependent on founders' access to local networks and resources or their previous entrepreneurial experience. This implies that

PEIs who invest in new or underdeveloped ecosystems are more likely to pull promising firms outside their ecosystem, creating a negative feedback loop that further depletes crucial resources and human capital and hinders local and regional economic development. However, in a robust innovation ecosystem, patient investors can positively impact economic development by increasing the likelihood of local scale-up.

This study also contributes to scholarship on the influence of equity investors on startups' performance. Recent studies have indicated how different types of equity investors shape startups' business models and strategic decision-making (Drover et al., 2017; Pahnke et al., 2015). We expand this bourgeoning literature by linking it with research on economic development. Our findings suggest that distinct types of equity investors shape how founders' resources and experience are used to advance specific growth outcomes. Because PEIs compel founders to adopt a long-term business model, the resources founders provide are channeled towards increasing startups' capacity for scale-up. Consequently, increases in founders' embeddedness and experience improve the likelihood that startups backed by PEIs would scale up. However, non-PEIs motivate founders to focus their resources and efforts on selling their firms rather than developing mature organizations. Accordingly, we find that increases in founders' embeddedness and experience increase the likelihood that startups that were not backed by PEIs experience an M&A. These results imply that, in addition to supplying large sums of capital, PEIs promote scale-up by shaping startups' business model.

6.1. Limitations and future research

A central challenge of our analysis was our ability to identify mature firms. We used the standard measure employed by Israeli government agencies and researchers to distinguish scale-ups from non-mature firms. This measure largely corresponds with the consensus among researchers that scale-ups should be defined as firms that produce revenues from sales and exhibit continuing growth (Coviello et al., 2024). However, this measure may not capture all relevant attributes of scale-ups. Similarly, our data did not allow us to capture PEIs based on their business model. Instead, we relied on investors' fund size and investment patterns. To better understand equity investors' effects on technological firms' growth outcomes, future studies should explore different ways to measure scale-ups and investors' goals.

Furthermore, our focus on Israel enabled an in-depth exploration of the relationships between equity investors and startups. However, it raises questions about the unique features of the Israeli case.

First, Israel has an exceptionally high rate of startups that relocate abroad (Shi et al., 2024; Conti and Guzman, 2023). This might bias our results on the likelihood of startup relocation. However, our findings that large investors positively impact firm relocation echo findings made in previous studies on the relationships between investors and startup relocation (Breznitz, 2021; Weik et al., 2024). This suggests that our findings concerning relocation are generalizable to contexts beyond Israel.

Second, our study did not address the role of government policies in encouraging patient investment and local scale-up more generally. Such questions are particularly relevant in Israel and other late-developing economies, where public policy played a crucial role in the advent and success of the high-tech sector (Breznitz, 2007; Maggor, 2021; Klingler-Vidra and Pardo, 2025). Future studies should extend the theory we have developed by examining the role of public policy and different national contexts driving local scale-up.

Finally, our study focused on a unique period with historically low interest rates worldwide that kept borrowing costs near zero. This fact dramatically increased the availability of equity investment and enabled investors to adopt a more patient investment outlook. There are growing indications that the demise of 'easy money' and the return of high interest rates have tempered the patience of equity investors, leading to a wave of 'exits'. Future studies should investigate the relationship between the monetary environment and equity investors' business strategy and how this relationship shapes local scale-up.

6.2. Policy implications

Our findings can inform policymakers seeking to advance economic development via the scale-up of technological firms. First, many governments have implemented policies to attract and produce equity investment (Quas et al., 2022). Our study highlights the importance of ensuring these policies are targeted to increase the presence of PEIs while screening out more short-term oriented funds. Policies can do so by conditioning the provision of state subsidies or assistance on a commitment to maintaining long-term investments in local firms, with scale-up as the primary objective.

Second, although we found that equity and patient investment can go hand-in-hand, this does not mean that government policies cannot encourage other sources of patient capital. For example, Ramon Pacheco Pardo and Robyn Klingler-Vidra have shown that scale-up in Japan and South Korea is obtained via 'matchmaking' policies that encourage existing conglomerates to fund, support, and collaborate with new startups (Klingler-Vidra and Pardo, 2025). In places like Singapore and China, the government takes an even more active role by directly providing patient capital and long-term funding via state-owned or state-guided funds (Lee et al., 2024; Li and Ban, 2025). Both may be viable alternatives to the equity-based model discussed here, particularly in the current era of high interest rates.

Finally, our study suggests that local scale-up becomes more likely when PEIs are paired with highly embedded or experienced founders. This implies that policy programs focusing solely on increasing the level of equity investment without simultaneously supporting the creation of a robust innovation ecosystem are likely to fail. Recent policy initiatives seem to have internalized this logic. For example, the EU's 2024 'Startup Europe' program seeks to improve access to finance capital and to accelerate the growth and impact of Europe's startup ecosystem. Given our findings, such programs seem likelier to foster local scale-ups than others.

CRediT authorship contribution statement

Erez Maggor: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Erez Aharon Marantz:** Writing – review & editing, Writing – original draft, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors have no conflicting interests.

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Appendix 1. Two-Step exponential competing risk models, including all growth outcomes

In this appendix we present an alternative modeling approach to the one we used in the main analyses in the paper. The original models assume that founders decision whether to continue to grow or pursue a quick 'exist' via an M&A is separate in prior to the decision of whether to scale-up locally or relocate abroad. To relax this assumption, we tested exponential competing risk models where the dependent variable included all four growth outcomes: M&A, relocation, local scale-up, and liquidation. In these models, firm trajectory outcome equaled the first outcome achieved. The data includes 137 scale-ups, 411 M&As (9.1 %), 902 relocations (17.6 %), and 1337 liquidations (26.2 %). Firms that had not experienced these events by 2020 were coded zero.

We were also concerned that the positive association between PEIs and local scale-up might result from the ability of PEIs to select promising startups rather than motivating these ventures to adopt a long-term business strategy. To address this endogeneity problem, we used a two-step approach. In the first step, we calculated the probability ventures obtained funding from PEIs in year t by estimating a semi-parametric survival model, including all ventures and founders' control variables. In the second step, we included these probabilities as an inverse Mills' ratio variable in our original competing risk model.

Table A1 presents the results for these models. The results are similar to the results reported in our main analyses. Model 1 explores our predictions in Hypothesis 1 that investment from PEIs increases the likelihood that startups either scale-up locally or relocate rather than experience an M&A. The results indicate that receiving funding from PEIs increased the likelihood of local scale-up by 335 % (=exp.(1.21)) compared to startups backed by non-PEIs.

Backing from PEIs also increased the likelihood that a startup relocated abroad by 85 % (=exp.(0.62)) compared to startups that were not backed by PEIs. Conversely, startups that received funding from PEIs were 51 % less likely (1-exp(−0.73)) to experience an M&A.

Model 2 tests the predictions of Hypotheses 2 and 3 that founders' eco-system embeddedness and experience moderate investors' influence on startups' growth outcomes. We find that the interactions between founders' ecosystem embeddedness, number of firms established, and PEI funding are statistically significant and in the same direction as in the main analyses. These findings largely confirm Hypotheses H2 and H3. Taken together, these models strengthen our main conclusions.

Table A1
Two-Step Competing Risk Models of Startup Growth Outcomes.

	1				2			
	M&A	Relocated Abroad	Scaled-up Locally	Liquidated	M&A	Relocated Abroad	Scaled-up Locally	Liquidated
Intercept	0.21	2.71***	0.25	0.23***	−0.10**	0.09**	0.02	0.02
Backed by PEIs	−0.73***	0.62***	1.11***	0.13**	0.12**	0.11***	−0.06**	1.23**
Founders' embeddedness	0.05*	−0.11**	0.02**	−0.23**	0.01**	−0.03**	0.01*	2.16**
Founders max # firms established	0.02***	0.02	0.03**	−0.07*	0.02**	0.01	0.01	0.06*
PEIs* embeddedness					−0.07***	−0.02***	0.02**	−0.11
PEIs* # firms established					−0.03**	−0.02***	0.02***	0.06
Firms' attributes								
Number funding rounds	0.35***	−0.08*	0.11	−0.37***	0.34**	−0.07*	0.10	−0.36***
Number of investors	0.09*	0.07	0.03	−0.21***	0.11*	0.05	0.02	−0.22***
Number of years since last funding	0.17***	0.00	−0.13**	0.21***	0.17***	0.00	−0.13**	0.21***
Number firms acquired	0.04	0.07	0.08*	−0.16**	0.02	0.06	0.10*	−0.17**
Received state funding	0.14*	−0.13*	0.09	0.14*	0.12*	−0.15*	0.05	0.13*
Year of establishment (fixed effect)	✓	✓	✓	✓	✓	✓	✓	✓
Product sector (fixed effect)	✓	✓	✓	✓	✓	✓	✓	✓
Investors' attributes								
Max total capital	0.23**	0.07	−0.01	0.08	0.20**	0.09	−0.02	0.09
Mean portfolio size	0.16*	−0.02	−0.00	0.00	0.15*	−0.01	−0.00	0.00
Percentage of late-stage investments	0.11*	0.14*	0.04	−0.19**	0.11*	0.15**	0.03	−0.16*
Max industry centrality	0.03	0.09	−0.05	−0.09	0.03	0.08	−0.03	−0.10
Foreign	0.02	0.17**	−0.09*	0.00	0.02	0.17**	−0.09*	0.00
CVCs	1.63***	−1.22***	−1.59***	1.27**	1.51**	0.10**	−1.61***	1.27*
Funded only by Angle investors	−1.73***	−2.12***	−3.89***	2.78***	−1.73***	−2.12***	−3.89***	2.78***
Founders' attributes								
Industry tenure	0.28**	−0.07**	0.03	0.12*	0.28**	−0.03	0.07	0.12*
Max number of successful firms	0.11*	0.02	0.01	−0.14**	0.11*	0.02	0.01	−0.13**
Sector diversity	0.00	−0.05	−0.10	0.14*	0.00	−0.05	−0.10	0.15*
Number founders	0.00	0.03	0.00	−0.01	0.00	0.03	0.00	−0.01
Year fix effects	✓	✓	✓	✓	✓	✓	✓	✓
Log pseudolikelihood	−812.328	−801.121	−811.111	−800.021	−789.112	−781.158	−792.123	−799.974
Number of firms	5689				5689			

Data availability

The authors do not have permission to share data.

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