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The pre-foundation evolution of proactiveness in born global and non-born global USOs

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ABSTRACT
This article adds to existing work on the drivers of early internationalization by exploring how born globals’ proactiveness evolves during their pre-foundation period and influences their internationalization timing post-foundation. We perform a comparative, qualitative field study of born globals and non-born globals based on 22 university spin-out companies. The findings reveal that proactiveness during pre-foundation, which emerged as an evolutionary nonlinear process in both categories of firms, was critical in facilitating or inhibiting early internationalization. It emerged that born globals behaved reactively during the earliest phases of pre-foundation, and gradually became more proactive as the firm approached formal foundation. Conversely, non-born globals first behaved proactively and, as the firm moved toward formal foundation, became more reactive. The findings bear important theoretical implications for international entrepreneurship, as well as for literature on university spin-outs and new venture behavior, by generating new context-specific, processual evidence on the role of pre-foundation proactiveness as an antecedent of USO early internationalization.

KEYWORDS
Proactiveness; early internationalization; pre-foundation; university spin-outs

Introduction
Born globals (BGs) are young and small firms that, despite their asset parsimony, internationalize soon after inception (Knight & Cavusgil, 2004) and derive a significant proportion of their sales from international markets (Paul & Rosado-Serrano, 2019). The growing significance of BGs, both in their number and contribution to economic development, has motivated research on their entrepreneurial behavior (Cavusgil & Knight, 2015). Studies have explored a range of factors that influence BG internationalization, from internal resources and capabilities (Jie et al., 2021; Yamakawa et al., 2013), to social and human capital (Alon et al., 2013; Menzies et al., 2020), to entrepreneurial orientation (Chandra et al., 2020). However, questions still arise around how these young, resource-poor and inexperienced firms manage their liability of newness and smallness, and the complexity of internationalization (Chandra et al., 2020).
et al., 2020; Jiang et al., 2020). Responding to Jiang et al.’s (2020) call to further investigate the firm-level antecedents of BG internationalization, this study explores the role of proactiveness, manifested from the earliest phases of firm creation. Given the highly heterogeneous definitions and operationalizations of BGs (Chetty & Campbell-Hunt, 2004) and the consequential fragmentation in conceptual understanding of the phenomenon (Hagen & Zucchella, 2014), this study focuses on the most widely employed (Dzikowski, 2018) and, arguably, most distinctive (Andersson et al., 2020) internationalization dimension of BGs: their internationalization timing.

International entrepreneurship (IE) studies traditionally suggest that BGs are highly proactive (Chandra et al., 2020), where proactiveness is understood as forward-looking behavior in the identification, evaluation and pursuit of opportunities ahead of rivals (Covin & Miller, 2014). This assumption stems from BGs operating in dynamic markets with short windows of opportunity (Monaghan & Tippmann, 2018) and facing unique challenges when identifying and targeting foreign markets (Rovira Nordman & Melén, 2008). As such, BGs must identify and pursue opportunities rapidly and efficiently to survive (Crick & Spence, 2005; Gabrielsson et al., 2014). Recent studies, however, have contrasted this view, finding that, while some firms internationalize early through proactive behavior (Gerschewski et al., 2016), others do so reactively through serendipitous events (Ciravegna et al., 2018). These conflicting conclusions have led to a limited understanding of the nature of BG behavior and how it affects early internationalization, warranting further investigation (Verbeke & Ciravegna, 2018).

This gap in our understanding can be explained by highlighting key limitations in prior studies. Similarly to wider entrepreneurship research (Nzembayie & Buckley, 2020), most BG studies assume that firm behavior is consistent over time (for example, Teixeira & Coimbra, 2014), inferring that if BGs are proactive or reactive at one point in time, they will sustain the behavior over time. This ignores the dimension of time (McMullen & Dimov, 2013) and the possibility that BGs are evolutionary (Madsen & Servais, 1997), behaving proactively and reactively at different points in time. Further, proactive behavior and the timing of internationalization are contingent on the interaction of multiple context-specific antecedents (Hannibal et al., 2016). However, most studies employ samples of highly heterogeneous BGs (Chetty & Campbell-Hunt, 2004), facing difficulties in disentangling proactiveness from other contextual antecedents of early internationalization. Finally, studies adopt an inconsistent view of BGs’ organizational histories prior to official foundation, resulting in the empirical observation space of behavior varying substantially across studies. Some identify pre-foundation as critical to subsequent firm behavior and internationalization timing (Madsen & Servais, 1997; Pettersen & Tobiasssen, 2012), and therefore include it in their investigations. Others align with the dominant
perspective that BGs are new and do not possess the deeply rooted routines and structures of older firms (Zhou & Wu, 2014), thus starting their observations from after foundation. Collectively, these limitations have hindered study comparability and knowledge advancement on how the evolutionary behavior of proactiveness influences internationalization timing.

The paper aims to address these limitations and advance BG research by exploring their behavioral processes in a distinctive context that offers opportunities for contribution: university spin-out companies (USOs). Given the comparability issues generated by the use of heterogeneous samples (Madsen & Servais, 1997), USOs are a promising setting for BG research (Cumming et al., 2009) as they feature high contextual homogeneity (Taheri & van Geenhuizen, 2011). USOs are firms that commercialize university research and that, despite distinctive challenges stemming from their academic origins, frequently internationalize early (Hewerdine & Welch, 2013). USOs tend to be comparable in terms of their high innovativeness, organizational settings, networks, and founder background (Ensley & Hmieleski, 2005). They, thus, offer the opportunity to explore how differences in firm-level proactiveness, in isolation from other pre-conditions, influence internationalization timing. USOs also experience typically long pre-foundation periods (Rasmussen et al., 2011) involving continuous behavioral changes in preparation for market entry (Vanaelst et al., 2006). This setting enables the study to explore USOs’ pre-foundation behavioral evolution and to more transparently capture its influence on their internationalization timing. We do so by conducting an inductive, comparative analysis of born global and non-born global (NBG) USOs.

This study adds to entrepreneurship literature by generating key insights on proactiveness as an antecedent of early internationalization (Jiang et al., 2020). It advances knowledge on the evolutionary, time-sensitive nature of proactiveness and how changes in its evolution influence internationalization timing in BGs and NBGs (McMullen & Dimov, 2013). Further, it adds key insights into the importance of firms’ organizational histories to their ability to internationalize early (Hewerdine & Welch, 2013). Finally, in recognition that BGs are heterogeneous firms whose behavior is contingent on their context, the study adds to research using samples of comparable firms (Rovira Nordman & Melén, 2008) by focusing on USOs. By doing so, the study also contributes to academic entrepreneurship research exploring USO internationalization (Cumming et al., 2009).

**Literature review**

**Proactiveness and born global firms**

Several studies have investigated the role of proactiveness in facilitating the internationalization of BGs and, in particular, their early internationalization (for example, Ciravegna et al., 2018, 2014). To synthesize knowledge on the
role of proactiveness in the context of IE, we conducted a systematic literature review (SLR). Relevant studies were identified by initially performing a keyword search within the ABI/INFORM and EBSCO databases, using the terms “proactiveness” AND “international” in the title or abstract, to ensure that proactiveness be among the principal components of the study. We excluded books, book chapters, and conference proceedings from the search, obtaining 101 results. We manually reviewed the title and abstract of each result to assess suitability for inclusion. A snowballing technique was also employed in tandem with this process, involving the review and inclusion of articles identified through the SLR itself. Articles that did not meet the following criteria were excluded from the search: publication in a peer-reviewed journal; written in English; proactiveness and internationalization being among the principal components of the paper; and proactiveness being regarded as firm-level behavior and not as a personality trait. This resulted in the inclusion of 27 articles in the systematic literature review.

The SLR revealed that most studies are grounded on the assumption that proactiveness drives positive internationalization outcomes. However, findings are inconsistent, illustrating that firms can achieve positive internationalization outcomes both proactively (Ngoma et al., 2017) and reactively (Dimitratos et al., 2014). This is due, at least in part, to three key factors. First, proactiveness has been investigated as an antecedent of a variety of internationalization dimensions, including its processes (Styles & Genua, 2008), international performance (Sundqvist et al., 2012), and the intensity (Ciravegna et al., 2014), scope (Boso et al., 2017) and timing of international activities (Pla-Barber & Escribá-Esteve, 2006). Such heterogeneity has contributed to comparability issues, warranting studies to focus on how the behavior affects specific outcomes. Second, most studies employ samples of heterogeneous firms (Dai et al., 2014). This is problematic, as entrepreneurial behavior is contingent on several contextual factors (Hannibal et al., 2016), such as networks, firm resources and founder background, that influence firms’ unique paths to internationalization. Based on contextual contingencies, firms may internationalize proactively or reactively (Ciravegna et al., 2018). Third, with rare exceptions (Andersson et al., 2020; Gabrielsson et al., 2014), studies are based on an assumption of behavioral linearity typical of most entrepreneurship research (Davidsson & Gruenhagen, 2021), where behavior is regarded as consistent over time and not as evolutionary. By investigating USO proactiveness as an evolutionary process that influences internationalization timing, we address these limitations.

The notion that proactiveness supports early internationalization is rooted in the idea that it enables young and small firms to identify and pursue profitable opportunities that are otherwise undetectable to others (McDougall et al., 1994). Further, it helps these firms to overcome internationalization challenges that reactive firms are often unable to overcome, such as the liability of newness
and smallness (Chandra et al., 2020). The liability of smallness reflects the challenges related to the small size of firms, such as a lack of substantial financial and human resources (Baum, 1996). The liability of newness refers to the inherent vulnerability of young firms with short organizational histories (Stinchcombe, 1965). Young firms do not possess the deeply rooted processes and stocks of knowledge that older firms exploit to integrate and convert new knowledge into value-adding activities (Cohen & Levinthal, 1990). As such, while internationalizing for the first time, young and small firms experience unfamiliar risky environments and learning challenges that slow down their internationalization (Zahra & Garvis, 2000). Arguably, through proactiveness, BGs can leverage a collection of resources such as know-how, skills, and founder experiences (Taheri & van Geenhuizen, 2011), and acquire new ones through dedicated learning (Casillas & Moreno-Menéndez, 2014) and social network exploitation (Zhou & Wu, 2014). These better position BGs to predict and respond to future changes (Styles & Genua, 2008) and help them manage the challenges of early internationalization (Chetty & Campbell-Hunt, 2004). However, the extent to which proactiveness supports early internationalization has been challenged (Hennart, 2014), with studies suggesting that BGs may behave reactively by discovering opportunities through serendipity (Rovira Nordman & Melén, 2008). BGs may internationalize in reaction to unsolicited orders from abroad (Ciravegna et al., 2018), bypassing several entrepreneurial steps, such as identifying and convincing potential clients (Hennart, 2014). This reduces time-to-market and affects internationalization timing. Given these inconsistencies, some scholars have highlighted the contingent nature of entrepreneurial behavior, which can be proactive or reactive (Coviello & Munro, 1997). Based on its characteristics, stakeholder interactions (Evers et al., 2012), resources and capabilities (Hannibal et al., 2016), each firm follows its own path to early internationalization. In some instances, firms internationalize through proactiveness, as they possess the resources and capabilities to do so and regard internationalization as profitable and low-risk (Ciravegna et al., 2018). In others, firms internationalize reactively by responding to unsolicited international orders (Hennart, 2014). An additional possibility is that BGs internationalize early by behaving proactively and reactively at different points in time.

As noted, the review highlights a limitation affecting the majority of studies: the failure to regard proactiveness as an evolutionary process over time. Most studies assume that the extent of proactiveness manifested at one point in time remains consistent throughout the evolution of the firm, failing to acknowledge that firms may behave proactively and reactively at different points in time. The assumption of behavioral linearity has resulted in limited available knowledge on how BG behavior evolves and generates internationalization outcomes. While scarce in BG research, some insights on the evolutionary and nonlinear nature of entrepreneurial behavior and proactiveness are available in wider entrepreneurship research.
**Behavioral nonlinearity and proactiveness**

That entrepreneurship is a process that progresses in stages is well acknowledged (McMullen & Shepherd, 2006). Like in IE, however, process-oriented research in entrepreneurship is scarce (McMullen & Dimov, 2013), despite repeated calls in this direction (Wiklund et al., 2011). Most scholars have superimposed a sequence of behavior onto the process (Davidsson & Gruenhagen, 2021) so that it can be assumed as constant in any given sample. Further, time, identified as a critical determinant of entrepreneurial outcomes, has played a limited analytical role in entrepreneurship research (Wadhwani et al., 2020), with most studies continuing to employ linear models that presume entrepreneurial action to occur at a single point in time (Dimov, 2011; Fisher, 2012). These studies regard time as an inconvenience, conceptualizing it as linear, fixed and exogenous (Wadhwani et al., 2020), as opposed to a malleable and embedding “space of experience” that shapes behavior (Godley & Hamilton, 2020). This assumption of behavioral linearity over time is problematic. Entrepreneurship is a dynamic journey that cannot exist without the passing of time. Yet, through their variance-based perspective, most studies “chop up time” and partition “the observation space along variables” (McMullen & Dimov, 2013, p. 1490), neglecting the sequence of events that is primarily responsible for entrepreneurial outcomes. By sectioning the behavior of BGs at one point in time and then assuming that it remains constant, we lose sight of the evolution of the firm and how milestones are achieved.

To address these limitations, research must structure the observation space to include the entire process, with all its iterations (Davidsson & Gruenhagen, 2021). Accordingly, we employ a process-based perspective to explore the evolving manifestations of proactiveness over time, from the moment of first business idea conception to the moment of first international market entry. Critically, we regard the time dimension as an indelible component of the outcome that emerges, where it is the evolution of the behavior, not its mere manifestation at one point in time, that generates outcomes. This is an important contribution to BG and entrepreneurship research. Few studies have focused on the development of BGs over time (Gabrielsson et al., 2014). During their earliest stages, BGs feature an inherent vulnerability typical of young ventures (Fernández-Guerrero et al., 2012) that results in low legitimacy and competitiveness (Freeman et al., 1983). As they age, BGs gain greater stability through resource and experience accumulation. How they make this transition successfully is unclear. Some authors point to the need for a well-balanced combination of proactiveness and reactiveness over time (Hallbäck & Gabrielsson, 2013), contrasting prior assumptions on the need for consistently high proactiveness (Jones & Coviello, 2005). Insights on these iterations, however, are limited in BG research.
The nonlinearity of proactiveness has been highlighted in wider entrepreneurship studies. Some note that high proactiveness entails high up-front costs linked to high search, learning and retaliation costs (Sapienza et al., 2005). Therefore, sustaining high levels of proactiveness for extended periods of time could be harmful to resource-poor firms (Wales, 2016), resulting in an alternation of high proactiveness with high reactiveness (Zellweger & Sieger, 2012). Others note that behavior naturally evolves as firms age, with higher levels of proactiveness during the earliest phases (Discua Cruz et al., 2013) due to a lack of experience and greater learning needs, and lower levels during later phases, as firms mature and become more routinized (De Massis et al., 2014; Short et al., 2009). Others still contend that each firm features unique, context-dependent evolutionary dynamics that influence the timing of their proactive behavior (Corbetta & Salvato, 2004). We build on these insights to explore the nonlinear, evolutionary nature of proactiveness in the context of early internationalization. We extend the empirical focus to include firms’ pre-foundation periods, emphasized as a critical yet neglected preparation phase for BG internationalization (Knight & Liesch, 2016). Figure 1 provides a summary of existing literature insights and identifies the research gap the study aims to address.

**The context of USOs**

USOs are a distinctive category of ventures that originate from university commercialization efforts, where research outputs are transferred to the market through the creation of a company. USOs represent an optimal context to advance BG research (Kiederich & Kraus, 2009), as targeting international
niche markets from inception is their preferred growth strategy (Franco-Leal et al., 2016). As a result, several BG studies have explored USOs (for example, Hewerdine & Welch, 2013; Pettersen & Tobiassen, 2012). While it is widely recognized that USOs are unique and face distinctive challenges in transitioning from the knowledge-driven academic context to the revenue-driven market (Rasmussen et al., 2015), they also feature long organizational histories and contextual homogeneity in many antecedents to early internationalization, such as founders’ prior knowledge and networks (Taheri & van Geenhuizen, 2011). This is important, as organizational history and contextual factors can determine contact patterns (Madsen & Servais, 1997) and competitive dynamics (Zahra & Garvis, 2000) that can influence behaviors toward internationalization (Teixeira & Coimbra, 2014).

USOs are typically formed by academics with advanced technological knowledge and limited prior business experience and know-how. These characteristics have led USOs to initially lack the competencies and knowledge required to successfully compete in international markets (Franco-Leal et al., 2016). Research has suggested that, to overcome internal shortcomings, BGs often exploit the social capital available through their networks (Coviello, 2006; Menzies et al., 2020). In the context of USOs, however, networks tend to be tight and homogeneous, mostly academic in nature and sharing similar knowledge bundles (Taheri & van Geenhuizen, 2011). USOs’ limited business knowledge and lack of partner heterogeneity can result in the production of similar perceptions, ideas and viewpoints (Rodan & Galunic, 2004), and render differentiation in offerings and competitive tactics difficult (Boeker & Karichalil, 2002). These characteristics can make USOs’ paths to early internationalization particularly challenging (Bjørnåli & Aspelund, 2012), with scholars identifying the efforts of USOs to build and leverage networks and acquire resources as key to their ability to internationalize early (Hannibal et al., 2016).

Critical to understanding USO behavior leading to early internationalization is the exploration of their pre-foundation evolution. The importance of pre-foundation as a determinant of internationalization timing has been highlighted by several BG scholars (for example, Hewerdine & Welch, 2013; Zahra, 2005). Firms experience high levels of uncertainty during their early development (Deakins & Whittam, 2000) and may develop skills and capabilities in advance of their foundation to cope with the challenges (Madsen & Servais, 1997). In USOs, this phase is typically long and can last several years (Rasmussen et al., 2011), involving a continuous orchestration of capabilities and behaviors (Vanaelst et al., 2006) that may be key to explaining why some USOs internationalize early, while others fail. Through evolving behavioral dynamics, some USOs may be able to shift from their instinctive conservative and reactive dispositions (Fryges & Wright, 2014) toward more proactive inclinations (Vohora et al., 2004). Others may build and leverage new and
existing networks beyond the academic environment, accessing the resource bundles needed to support early internationalization (Pettersen & Tobiassen, 2012). These networks may include USOs’ parent institutions, multinational companies, investors, surrogate entrepreneurs that provide them with the knowledge, finances and legitimacy required to enter the market early (Messina et al., 2020). Collectively, these patterns may be critical to USOs’ ability to internationalize early and are dependent on their dedicated efforts to learn, develop and exploit new managerial capabilities (Nikiforou et al., 2018) and networks (Pettersen & Tobiassen, 2012). Thus, exploring how USOs reconfigure their behavior during pre-foundation promises to generate insightful findings on how proactiveness evolves and influences their internationalization timing.

**Methodology**

**Research design**

We conduct a qualitative field study of 22 USOs from two Italian universities. This approach is the optimal method to address process-based questions (Kriz & Welch, 2018) aiming to provide a contextualized explanation for why and how events occur as they do (Welch et al., 2011). Therefore, a qualitative approach is aligned with the study’s aim to explore the evolution of proactiveness during pre-foundation in the context of BG and NBG USOs. Italian USOs constitute the unit of analysis of this study. We define USOs as companies formed by faculty or doctoral students and that center on a technology originating from university research (Clarysse et al., 2011). We limit our focus to high-technology USOs originating from technical university departments such as engineering and technology. Most USOs are knowledge-intensive and highly innovative and, while the BG phenomenon is not limited to high-technology firms (Rialp et al., 2005), research suggests that early internationalization tends to be most common in technology-intensive sectors, given their international niche nature and firm openness to rapid change (Ramos et al., 2011). We selected Italy as the country-context because it is small and presents limited domestic demand, driving its high-technology ventures, including USOs, to develop a stronger international orientation compared to firms in larger markets (European Commission, 2015). Yet, despite stronger internationalization intentions, not all such firms are able to internationalize early, with many internationalizing gradually or remaining domestic (European Commission, 2015), pointing to important behavioral differences between BGs and NBGs. Investigating the Italian context also addresses research calls to explore BGs (Bolzani et al., 2014) and USOs (Ramaciotti & Rizzo, 2015) in continental Europe, where the entrepreneurial ecosystems are less developed than in the UK and US (Wright et al., 2007).
An in-depth qualitative field study of multiple USOs was employed to yield detailed insights into the evolution of proactiveness in BGs and NBGs. In line with Knight and Cavusgil (1996) definition, we define BGs as firms that commence exporting within three years after foundation. A purposeful sampling approach was employed to identify cases that were theoretically salient (Kriz & Welch, 2018), and not cases from which to generalize to a wider population (Eisenhardt, 1989). The first step involved identifying target universities. To minimize external variation beyond the focal phenomenon (Eisenhardt, 1989), two universities were selected on the basis of homogeneity across three dimensions. First, the universities were located within the same geographic area, ensuring comparability across sociopolitical and economic factors. Second, both institutions performed world-leading research in Engineering and Technology, both ranking in the top 50 globally (QS World University Rankings, 2018), ensuring comparability in research output quality. Third, the universities regarded research commercialization through USOs as a strategic priority, both being among the most productive Italian universities in USO creation (NETVAL, 2018). Sampling subsequently involved identifying target USOs from these universities. Selection initially involved creating a list of target USOs from each university by consulting the “Spin-off Italia” database, which listed 121 USOs deriving from both universities. The founders of these USOs were contacted to first, establish study suitability and, second, ascertain interview availability. The aim was to perform interviews with both BG and NBG USO respondents that met the following criteria: they had been involved in the USO’s formation from its earliest stages of pre-foundation; the USO’s market offerings stemmed from academic research; the USO was established with the objective of internationalizing its offering. Due to the ambiguity around “appropriate sample size” in qualitative research (Boddy, 2016), and the difficulties involved in estimating data saturation (Guest et al., 2006), we followed Marshall et al.’s (2013) suggestion to identify a numerical target based on sample sizes of comparable studies. Vohora et al.’s (2004) study on USO formation was used as a reference. The study examined nine USOs and, accordingly, a target of nine USOs for each category (BGs and NBGs) was set. Once this number was reached, remaining scheduled interviews were performed, however, further contact ceased. This resulted in a final sample of 12 BG USOs and 10 NBG USOs. Table 1 provides details of the interview respondents.

**Data collection**

A first round of data collection aimed at gathering background data on the universities and involved interviews with university ecosystem representatives, such as Technology Transfer Office (TTO) and incubator managers. The primary data source was obtained through semi-structured phenomenological
Table 1. Interview respondent details.

<table>
<thead>
<tr>
<th>USO</th>
<th>University</th>
<th>Industry</th>
<th>Relationship With University</th>
<th>Technology</th>
<th>Interview Participant</th>
<th>Found. year</th>
<th>Foreign Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG:A</td>
<td>Uni1</td>
<td>Nuclear engineering Electronics and ICT</td>
<td>Formal partnership</td>
<td>Algorithm and model development for the performance of industrial systems.</td>
<td>Academic founder (CEO)</td>
<td>2012</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:B</td>
<td>Uni1</td>
<td>Energy</td>
<td>Formal partnership</td>
<td>Diagnostic device for industrial processes.</td>
<td>Academic founder (CEO)</td>
<td>2014</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:E</td>
<td>Uni1</td>
<td>Mechanics</td>
<td>No formal relationship</td>
<td>Technology for the remote supply of energy.</td>
<td>Academic founder (R&amp;D director) surrogate entrepreneur (CEO)</td>
<td>2009</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:V</td>
<td>Uni1</td>
<td>Electronics and ICT</td>
<td>No formal relationship</td>
<td>Robots for Industrial automation in the pharmaceutical industry.</td>
<td>Academic founder (R&amp;D director) surrogate entrepreneur (CEO)</td>
<td>2014</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:H</td>
<td>Uni1</td>
<td>Electronics</td>
<td>Formal partnership</td>
<td>Technology for the characterization of MEMS sensors.</td>
<td>Academic founder (CEO)</td>
<td>2014</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:K</td>
<td>Uni1</td>
<td>Biomedical engineering</td>
<td>No formal relationship</td>
<td>Diagnostic device for respiratory pathologies.</td>
<td>Academic founder (CEO and R&amp;D director)</td>
<td>2010</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:L</td>
<td>Uni1</td>
<td>Aerospace engineering</td>
<td>No formal relationship</td>
<td>Algorithm for the millimetric measurement and monitoring of geophysical phenomena</td>
<td>Academic founder (CEO)</td>
<td>2000</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:M</td>
<td>Uni1</td>
<td>Electronics</td>
<td>No formal relationship</td>
<td>Technology for X-ray and gamma-ray applications.</td>
<td>Academic founder (CEO)</td>
<td>2009</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:N</td>
<td>Uni1</td>
<td>Electronics</td>
<td>No formal relationship</td>
<td>Innovative e-bike motor.</td>
<td>Academic founder (marketing manager)</td>
<td>2013</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:P</td>
<td>Uni2</td>
<td>Fire engineering</td>
<td>No formal relationship</td>
<td>Custom-made numerical solutions in the fields of fire engineering and thermal science.</td>
<td>Academic founder (CEO)</td>
<td>2007</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:Q</td>
<td>Uni2</td>
<td>Energy</td>
<td>No formal relationship</td>
<td>Storage systems for renewable energy.</td>
<td>Academic founder (CTO)</td>
<td>2005</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>BG:R</td>
<td>Uni2</td>
<td>Electronics</td>
<td>No formal relationship</td>
<td>Innovative software for the resolution of modeling problems.</td>
<td>Academic founder (president)</td>
<td>2007</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>NBG:G</td>
<td>Uni1</td>
<td>Mechanics</td>
<td>No formal relationship</td>
<td>Robots for Industrial automation and bin picking.</td>
<td>Academic founder (R&amp;D director) surrogate entrepreneur (CEO)</td>
<td>2006</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:I</td>
<td>Uni1</td>
<td>Energy</td>
<td>No formal relationship</td>
<td>Consulting services in the field of renewable energy and power electronics.</td>
<td>Academic founder (R&amp;D director) surrogate entrepreneur (director)</td>
<td>2006</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:J</td>
<td>Uni1</td>
<td>Mathematics</td>
<td>No formal relationship</td>
<td>Custom-made solutions and software in a wide range of industries.</td>
<td>Academic founder (R&amp;D director surrogate entrepreneur (CEO))</td>
<td>2010</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:T</td>
<td>Uni2</td>
<td>ICT</td>
<td>No formal relationship</td>
<td>Technology aimed at efficient energy consumption.</td>
<td>Academic founder (CEO)</td>
<td>2011</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:U</td>
<td>Uni2</td>
<td>Electronics</td>
<td>Formal partnership</td>
<td>Intelligent LED lighting bulbs.</td>
<td>Academic founder (CEO) academic founder (scientific advisor)</td>
<td>2013</td>
<td>&gt; 3 years</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>USO</th>
<th>University</th>
<th>Industry</th>
<th>Relationship With University</th>
<th>Technology</th>
<th>Interview Participant</th>
<th>Found. year</th>
<th>Foreign Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBG:C</td>
<td>Uni1</td>
<td>Mechanics</td>
<td>Formal partnership</td>
<td>Technology for the conversion of traditional vehicles into hybrid or electric vehicles.</td>
<td>Executive assistant (no ownership)</td>
<td>2012</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:D</td>
<td>Uni1</td>
<td>Chemistry</td>
<td>Formal partnership</td>
<td>Custom-made solutions for surface coatings.</td>
<td>Academic founder (R&amp;D director) surrogate entrepreneur (CEO)</td>
<td>2012</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:F</td>
<td>Uni1</td>
<td>Geomatics</td>
<td>No formal relationship</td>
<td>Custom-made solutions using geomatic technologies.</td>
<td>Academic founder (CEO) academic founder (R&amp;D researcher).</td>
<td>2012</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:O</td>
<td>Uni1</td>
<td>Energy</td>
<td>No formal relationship</td>
<td>Custom-made solutions in the field of energy efficiency.</td>
<td>Academic founder (CEO)</td>
<td>2013</td>
<td>&gt; 3 years</td>
</tr>
<tr>
<td>NBG:S</td>
<td>Uni2</td>
<td>Aerospace engineering</td>
<td>No formal relationship</td>
<td>Custom-made technologies for aerial surveillance.</td>
<td>Academic founder (president)</td>
<td>2005</td>
<td>&gt; 3 years</td>
</tr>
</tbody>
</table>
interviews with USO respondents, producing detailed retrospective accounts capturing the entire pre-foundation and pre-internationalization evolution of USOs. Interview involved asking participants to provide a detailed description of their USO’s formation, from the research phase up to first international market entry. Questions sought to construct a pattern of critical events in BG and NBG USOs, capturing how firms behaved during the formation process and, particularly, toward emerging obstacles and opportunities. Interviews were performed face-to-face and by telephone, were openly recorded, and lasted between 40 and 90 minutes. Field notes were taken throughout data collection, and interviews were transcribed and translated to ensure transparency and replicability.

Data analysis

Data analysis involved an iterative process, where emergent findings were further examined in relation to existing research and informed the direction of further inquiry (Miles et al., 2014). Upon completion of data collection, transcripts were coded following Miles et al.’s (2014) guidelines, followed by within and cross-case analysis to interpret the codes in relation to the research question. Analysis involved three stages. First, first-cycle coding was performed, generating a large number of descriptive categories summarizing sections of data. The second cycle of coding involved pattern searching, leading to the identification of fewer overarching themes emerging from the first-cycle codes. Second-cycle themes were aligned with the conceptual lens of proactiveness. Drawing on existing conceptualizations of proactiveness (Covin & Slevin, 1989; Miller, 1983), we identified forward-looking and anticipatory behaviors (Wales et al., 2019) that related to the processes of opportunity identification and pursuit (Cumming et al., 2009; Wales et al., 2019). This led to the identification of two overarching data themes: opportunity identification, reflecting entrepreneurial behaviors employed to recognize the opportunity; and opportunity pursuit, involving behaviors aimed at evaluating and exploiting the opportunity. To capture how proactiveness evolved during pre-foundation, a third overarching data theme was identified: the evolution of proactiveness. The final cycle of analysis involved within and cross-case analysis to identify commonalities and differences across USOs, and to confirm that events and processes were not idiosyncratic (Miles et al., 2014). The USOs were clustered into two categories based on whether they internationalized within or after three years from foundation, BGs and NBGs. Each aggregate dimension was examined within and across USO categories, resulting in the identification of differentiating patterns between BGs and NBGs. Table 2 shows the structuring of the data, including first-cycle codes, second-cycle codes and aggregate dimensions.
**Table 2. Case data summary.**

<table>
<thead>
<tr>
<th>Born Global USOs</th>
<th>Aggregate Dimension 1: Opportunity Identification</th>
<th>Non-Born Global USOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-cycle codes</td>
<td>Second-cycle codes</td>
<td>First-cycle codes</td>
</tr>
<tr>
<td>USOs identified their entrepreneurial opportunity by responding to external stimuli, such as unsolicited requests by market parties, being approached by TTO staff regarding technology’s market potential, or noticing potential gaps in the market that technology could address. <strong>Reactive</strong></td>
<td>Opportunity discovery</td>
<td>USOs identified the entrepreneurial opportunity by actively searching for a market gap that would match their existing technology. <strong>Proactive</strong></td>
</tr>
<tr>
<td>Opportunity was inherently market-driven. As the discovery of the opportunity was related to the identification of an unmet market need, by definition it allowed USOs to anticipate market rivals. USO founders noticed unanticipated changes in the industry within which their applied research was contextualized. <strong>Reactive</strong></td>
<td>Opportunity creation</td>
<td>Some USOs search for market gaps that they could address by purposely developing a technology. <strong>Proactive</strong></td>
</tr>
<tr>
<td>USO founders received unsolicited requests on behalf of market parties, such as potential clients and market experts, which led them to identify the opportunity. <strong>Reactive</strong></td>
<td>Alertness</td>
<td>Opportunity was mostly technology-driven, sometimes market-driven in that the technology was further developed to meet market needs.</td>
</tr>
<tr>
<td>USOs identified an opportunity that had both domestic and international demand.</td>
<td>Job creation motives</td>
<td>USOs were primarily motivated by the job creation prospects related to creating a company, often due to the lack of job opportunities in academia. <strong>Proactive</strong></td>
</tr>
<tr>
<td><strong>International outlook</strong></td>
<td>Social network intervention</td>
<td>Job creation was either for the researchers who founded the company, or for other researchers (not the founders). This approach at times resulted in the identification of unattractive opportunities or ones that were already crowded by rivals.</td>
</tr>
<tr>
<td><strong>International outlook</strong></td>
<td>Desire to create business</td>
<td>Some USOs were primarily motivated by the prospect of supplementing researchers academic salaries with industry-derived income. <strong>Proactive</strong></td>
</tr>
<tr>
<td><strong>USOs identified an opportunity that had both domestic and international demand.</strong></td>
<td><strong>Non-Born Global USOs</strong></td>
<td>This approach at times resulted in the identification of unattractive opportunities or ones that were already crowded by rivals.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Born Global USOs</th>
<th>Aggregate Dimension 2: Opportunity Pursuit</th>
<th>Non-Born Global USOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>First order codes</td>
<td>Second order codes</td>
<td>First order codes</td>
</tr>
<tr>
<td>Born Global USOs</td>
<td>Non-Born Global USOs</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>USOs became very committed to the venture, making their professional priority.</td>
<td>USOs manifested low commitment to the venture, largely viewing it as a second job and prioritizing university-related duties.</td>
<td></td>
</tr>
<tr>
<td>Strong commitment to venture</td>
<td>Reactive</td>
<td></td>
</tr>
<tr>
<td>USO founders left academia to pursue the opportunity and devoted a lot of</td>
<td>When USO founders left academia to pursue the opportunity, this was most often due to a lack of job opportunities within the university environment.</td>
<td></td>
</tr>
<tr>
<td>time to the creation of the USO.</td>
<td>Reactive</td>
<td></td>
</tr>
<tr>
<td>USO founders developed high levels of resilience when faced with adversity.</td>
<td>Due to resource scarcity, USOs performed tasks as and when resources became available.</td>
<td></td>
</tr>
<tr>
<td>Proactive</td>
<td>Reactive</td>
<td></td>
</tr>
<tr>
<td>Due to resource scarcity, a lot of effort and time was devoted to</td>
<td>Given their lack of industry experience and business skills, USOs manifested extremely weak business skills.</td>
<td></td>
</tr>
<tr>
<td>searching for sources of funding, including investors, funding</td>
<td>Academic founders also manifested limited interest and willingness to develop business skills, particularly when they involved external partners such as corporate partners and surrogate entrepreneurs.</td>
<td></td>
</tr>
<tr>
<td>competitions and corporate partners. Proactive</td>
<td>Academic founders viewed it as being beyond their role to develop business skills. Reactive</td>
<td></td>
</tr>
<tr>
<td>Despite lack of industry experience and business skills, USOs devoted</td>
<td>USOs employed a passive approach to problem resolution by delaying addressing issues to a later date in the future, often post-foundation. Reactive</td>
<td></td>
</tr>
<tr>
<td>a lot of time and effort to the development of their business skills and to</td>
<td>USOs manifested a gradual approach to growth, displaying limited ambition to grow fast. Dominant approach was to resolve only urgent issues as and when they emerged. Reactive</td>
<td></td>
</tr>
<tr>
<td>the preparation of a suitable business plan. This was done through external</td>
<td>Much of this approach was related to founders’ lack of confidence in their entrepreneurial ability and their view that they were engineers, not entrepreneurs. Reactive</td>
<td></td>
</tr>
<tr>
<td>engagement with market agencies, corporate partners, prospective clients, or</td>
<td>USOs showed low awareness of the competitive landscape and of their competitive positioning within the market. Reactive</td>
<td></td>
</tr>
<tr>
<td>through active involvement of and learning from internal surrogate entrepreneurs. Proactive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Despite initial lack of confidence in their own entrepreneurial ability,</td>
<td>In some cases, USOs were aware of their competitive disadvantage compared to rivals, an issue whose resolution was postponed to post-foundation. Reactive</td>
<td></td>
</tr>
<tr>
<td>USOs showed confidence in their ability to learn the necessary skills.</td>
<td>Reactive</td>
<td></td>
</tr>
<tr>
<td>USOs manifested an entrepreneurial spirit and a “let’s try” attitude to the</td>
<td>USOs had a strong awareness of who their market (both domestic and international) were, and of their competitive positioning within the market. Proactive</td>
<td></td>
</tr>
<tr>
<td>pursuit of the opportunity. Proactive</td>
<td>USOs manifested strong desire to be global market leaders and to compete with the largest international players. Proactive</td>
<td></td>
</tr>
<tr>
<td>USOs had great confidence in the quality of their technology and the research</td>
<td>USOs had a strong awareness of their competitive advantage compared to rivals. Proactive</td>
<td></td>
</tr>
<tr>
<td>underpinning it. Proactive</td>
<td>High competitive awareness</td>
<td></td>
</tr>
<tr>
<td>USOs manifested growth-related ambition. Proactive</td>
<td>Low competitive awareness</td>
<td></td>
</tr>
<tr>
<td>USOs developed a strong awareness of who their market (both domestic and</td>
<td>In some cases, USOs were not interested in differentiating themselves from market rivals. Reactive</td>
<td></td>
</tr>
<tr>
<td>international) were, and of their competitive positioning within the market.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USOs manifested strong desire to be global market leaders and to compete with</td>
<td></td>
<td></td>
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<tr>
<td>the largest international players. Proactive</td>
<td></td>
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</tr>
<tr>
<td>USOs had a strong awareness of their competitive advantage compared to rivals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
Table 2. (Continued).

<table>
<thead>
<tr>
<th>Born Global USOs</th>
<th>Aggregate Dimension 3: The Evolution of Proactiveness</th>
<th>Non-Born Global USOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>USOs identified their first clients during pre-foundation and devoted great efforts to ensuring high-market readiness at foundation. <strong>Proactive</strong></td>
<td>Early identification of clients</td>
<td>USOs identified their first clients after firm foundation, as this was regarded as an activity that would require extensive efforts and more venture preparation and was, therefore, postponed to a later stage in the future. <strong>Reactive</strong></td>
</tr>
<tr>
<td>USOs delayed foundation until all elements were in place to ensure high market readiness. <strong>Reactive/Proactive</strong></td>
<td>Late identification of clients</td>
<td>In many cases, USOs were aware that the venture was not ready to enter the market at foundation. Despite this, the founders founded the venture and decided to continue the firm’s market preparation after its foundation. <strong>Reactive/Proactive</strong></td>
</tr>
<tr>
<td><strong>First order codes</strong></td>
<td><strong>Second order codes</strong></td>
<td><strong>First order codes</strong></td>
</tr>
<tr>
<td>Opportunity discovery was very rapid, as it began and ended during pre-foundation and resulted in the identification of an unmet market demand before rivals. This occurred through founders’ reaction to external stimuli, either through their own alertness or through social network intervention. <strong>Reactive</strong></td>
<td>Reactive opportunity discovery</td>
<td>Opportunity creation took place over an extended period of time, as it began during pre-foundation and continued throughout the early stages of post-foundation through constant opportunity refinement. This was due to the lengthy and resource intensive nature associated with information acquisition and opportunity searching, as well as the identification of opportunities that were unattractive and/or crowded by market rivals, and whose boundaries were often unclear. <strong>Proactive</strong></td>
</tr>
<tr>
<td>Opportunity pursuit began during pre-foundation and involved a lengthy process of business skill development, searching for and identifying clients and sources of funding, business plan development. This resulted in the foundation of USOs that had already secured clients pre-foundation and that were ready to enter the market immediately after foundation. <strong>Proactive</strong></td>
<td>Proactive opportunity pursuit</td>
<td>Opportunity creation began after foundation and took place in a slow, gradual manner. Due to their passive approach, USOs typically prioritized clients that had been identified domestically, and focused on international clients at later stages of firm development. This resulted in the foundation of firms that were underdeveloped and delayed market entry. <strong>Reactive</strong></td>
</tr>
<tr>
<td>USOs experienced long pre-foundation periods, often lasting several years. This was due to founders wanting to make sure everything was in place and that the USO was ready for the market upon founding, leading them to delay foundation. This resulted in USOs being relatively mature at foundation and being able to enter the market immediately. <strong>Reactive/Proactive</strong></td>
<td>Long pre-foundation period</td>
<td>USOs experienced short pre-foundation periods, usually a few months. Most USOs were founded shortly after the business idea was conceived, with little to no preparation for market entry being done during pre-foundation. Most of the venture preparation activities were delayed to after firm foundation. <strong>Reactive</strong></td>
</tr>
<tr>
<td></td>
<td>Short pre-foundation period</td>
<td></td>
</tr>
</tbody>
</table>
Findings

Opportunity identification

Opportunity identification was the first aggregate dimension of proactive behavior and it reflects the processes employed by USO founders to identify the opportunity related to their technology. All USOs across the two categories identified opportunities within inherently international niche markets. However, important behavioral differences were identified between BGs and NBGs during this process: BGs behaved reactively and NBGs behaved proactively. All BGs reactively discovered the opportunity related to their technology, where they serendipitously recognized an unmet market need. This process involved passive reaction to outside stimuli, and it occurred in two ways: through alertness (Kirzner, 1979) and through social network engagement. It occurred through alertness when entrepreneurs independently recognized growing domestic and international demand for their research-driven technology through their own heightened market awareness. This occurred for instance, in case BG:N, where the founders serendipitously noticed an unmet need in the bicycle industry that could be addressed through their existing, research-driven prototype for an e-bike motor.

At a certain point we noticed that, on the market, our technology-driven invention started to make sense, as the e-bike market had surpassed the motorbike market in Europe . . . and so we decided to create a company. (BG:N)

Opportunity discovery took place through network engagement when BG USOs received unsolicited orders by external parties for their research-driven technology. In BG:H, the founders had developed a Micro-Electro-Mechanical Systems (MEMS) sensor technology that was noticed and requested by a potential client, resulting in the founders discovering an unmet market gap.

This technology was noticed by a company that we had previously worked with [as a research group] and they asked us ‘why don’t you show us how it works, we would actually need it.’[...] That’s why we created the spin-out. (BG:H)

In BGs, the opportunity identification process began and ended during pre-foundation, helping entrepreneurs to rapidly progress to the later phases of opportunity assessment and pursuit. Most NBGs engaged in proactive opportunity creation, where opportunities are developed by the entrepreneurs and are contingent on their own perceptions and human actions (Alvarez et al., 2013). Opportunity creation involved founders proactively searching for and identifying market applications for their research-driven technologies, remaining uncertain of the revenue-generating potential of these applications throughout the process. Some NBG founders regarded firm creation as an end in itself, not a means to an end, as they were motivated by the mere aspiration to found a company and showed little concern about opportunity
attractiveness. Others were driven by its job creation potential, either for themselves or for other researchers. This often led NBGs to identify opportunities that were unattractive and/or crowded by rivals.

[Searching for this opportunity] was a matter of providing continuity to a research project that generated good results and that developed people, competencies and know-how that we did not want to lose. We [also] wanted to create employment for our researchers, so that’s why this venture was born. (NBG:I).

The process of proactive opportunity creation resulted in many NBGs continuing to refine their opportunity even post-foundation, as they continued to search for an appropriate market gap for their technology. Ultimately, this lengthy search for an opportunity delayed NBGs’ progression toward subsequent entrepreneurial stages and, inevitably, international market entry.

We found many opportunities for us in the market.[…] We have a wide range of market applications for this technology. But we might also be viewed as underdeveloped because we haven’t chosen our specific path yet. We’re still working on that. (NBG:D).

In summary, during the process of opportunity identification, BGs reactively and serendipitously discovered an unaddressed need in the market either through alertness or through interaction with social networks. NBGs proactively created market opportunities, albeit while showing little awareness of opportunity attractiveness.

Opportunity pursuit

The second aggregate dimension of proactiveness was opportunity pursuit, which refers to the processes involved in assessing, preparing for and exploiting the identified opportunity. These included business plan development, target client identification, and securing external finance and corporate partners. Compared to NBGs, BGs were better prepared, possessed stronger business skills, and manifested greater market awareness and commitment to the USO prior to opportunity pursuit. Most BG USOs either identified and involved experienced entrepreneurs who knew how to behave in the marketplace from the outset, or proactively developed the skills needed to enter the market during pre-foundation. In the former case, external entrepreneurs became the primary drivers of the USO from opportunity identification to assessment and pursuit, by developing the USO’s business plan, identifying and targeting clients, and seeking external funding.

[The surrogate entrepreneur’s] background mainly centred on technological markets. [He] developed a business plan to be presented to the corporate partner, and they were delighted with the plan. So that’s when we started the whole process. (BG:E).
In cases where BG founders had limited business experience and skills, and were unable to involve external entrepreneurs, they proactively developed these skills during USO development by acquiring and assimilating the know-how available within external networks, such as prospective clients and corporate partners. This was evident in BG:B, where the founders developed marketing skills through the support of prospective clients who “made me understand how I should present my product to market parties.” Most NBGs had low levels of business skills throughout USO development, and viewed the marketplace as very challenging. NBGs were more reactive in skill learning and development, reaching out to external parties less than BGs and accessing fewer learning opportunities. As a result, NBGs struggled to approach clients and understand their needs.

Explaining what you are offering to market parties that don’t speak a technical language, or even understanding the market and how to sell your product… these are all things we really struggled with, and are still learning how to do. (NBG:T).

BGs and NBGs also differed in their levels of confidence, dedication, and competitive awareness. The majority of academic founders across the two categories identified their “academic identity” as a source of insecurity, admitting that they “felt uncomfortable with the notion of being considered entrepreneurs” (BG:M). However, BG founders reacted to this by committing to the USO, devoting extensive time to it, rendering it their professional priority, aiming to generate profits and outcompete rivals.

In the end, with a lot of effort, I managed to become a CEO! In life, people need to be prepared and able to exploit certain opportunities. However [the opportunity] should be something that allows you to become among the best in the world. (BG:L).

NBGs showed significantly less commitment to the USO. They behaved more reactively toward opportunity pursuit during pre-foundation by waiting for problems to resolve themselves, or postponing their resolution to a later stage, leading to a gradual approach to firm development. This occurred in NBG:D, where the entrepreneurs struggled to define the market application for their technology, yet decided to found the USO and address the problem after foundation. Similarly, NBG:U stated that “We didn’t have anyone working on [the firm] full-time, we worked full-time for the university, that was our main job. So the spin-out was not a priority, any work we were doing on it was for free.”

Finally, BGs and NBGs differed in their learning and competitive understanding of the market, which affected how and when they approached and secured initial clients. BGs gained greater competitive awareness of the domestic and international competitive environments, the market gap(s) they were targeting, and their positioning within the market. Many BGs identified themselves as market leaders, with BG:N’s stating that “While all of [our rivals] made central motors, there are very few companies that targeted this particular niche in the
market, which was basically left to ourselves.” Given the niche nature of BGs’ opportunities, their learning and competitive awareness related to both domestic and international markets, involving the proactive pursuit of all attractive opportunities, irrespective of location. Conversely, NBGs achieved lower levels of learning and competitive awareness during pre-foundation. They mainly focused on the technical aspects of their technology, rather than on the opportunity, and they often showed uncertainty about demand and competition. This occurred in NBG:C, who stated that “our technology is already available in other European countries. So we changed our direction and focused on the Italian market [where] no company uses our particular technology. Obviously there are firms that use similar technologies.”

Through their greater market understanding and competitive awareness, coupled with proactive engagement with market parties such as prospective clients and corporate partners, BGs identified and secured their first clients before foundation. This supported their market entry shortly after foundation, accelerating internationalization.

We had a good idea of the technologies on the market at that point. Through the trial software we had launched, we established stable contacts with clients at least a couple of years prior to foundation, so we were able to sell almost immediately. (BG:R).

Conversely, through their reactive approach to pursuit, their weaker market learning, and their tendency to postpone market entry preparation, NBGs secured their first clients post-foundation, delaying first market entry, which tended to be domestic.

We certainly didn’t have a preordained process to follow. Sure, once we founded the spin-out, we started planning the exact steps we needed to take … We officially sold our first product this year [4 years post-foundation]. (NBG:U).

These processes accelerated internationalization for BGs and delayed it for NBGs.

**The evolution of proactiveness**

BGs and NBGs differed in terms of the duration of the opportunity identification and pursuit phases, as well as when and how these processes were performed. The opportunity identification phase began, in both BGs and NBGs, during pre-foundation and immediately followed the research phase. BGs completed this process during pre-foundation, enabling entrepreneurs to target more refined opportunities and progress to opportunity pursuit before firm foundation. This was facilitated by the employment, on behalf of BGs, of reactive behavior toward opportunity identification. By responding to external serendipitous stimuli, BGs bypassed the time-consuming and resource-intensive search for opportunity-related information and rapidly discovered
an unmet market gap. In NBGs, the opportunity identification phase involved proactive behavior in the creation of an opportunity. Due to the lengthy process associated with NBGs’ market information search and continuous opportunity refinement, this phase began during pre-foundation and persisted after USO establishment. This led to the foundation of USOs that needed further development, which delayed NBGs’ preparation for and engagement in pursuit.

After opportunity identification, BGs’ behavior shifted from mainly reactive to primarily proactive, by engaging in venture preparation processes such as business skill and plan development, intensive learning, partner searching, increasing commitment and identifying and targeting clients. These activities occurred prior to USO foundation and created the basis for a rapid international market entry post-foundation. Conversely, NBG behavior shifted from mainly proactive during opportunity identification, to primarily reactive during opportunity pursuit, with firms postponing most venture preparation and pursuit activities to after foundation. This delayed their market entry and, ultimately, internationalization. It can be concluded, therefore, that while BGs manifested low proactiveness during the earliest stages of pre-foundation, they increased it as they progressed through later phases. NBGs initially manifested high proactiveness and became more reactive as they evolved through opportunity preparation and pursuit.

A partial explanation for BGs being better prepared for pursuit at foundation can be identified in their tendency to undergo longer pre-foundation periods compared to NBGs, on average 3.7 years and, in extreme cases, up to 13 years (BG:E). This gave entrepreneurs more time to examine the competitive landscape and address any challenges prior to foundation. Indeed, most BGs delayed foundation until they felt ready to enter the market.

From the idea to the foundation of the firm, two years went by [during] which our business plan changed a lot. Perhaps the fact that it took us two years to develop a good business plan contributed to our later growth. (BG:M).

We went through a very long formation period . . . We put huge amounts of work in this project, we wanted to be sure of what we would be able to offer the market. (BG:B)

Conversely, NBG USOs experienced shorter pre-foundation periods, usually lasting six months, which contributed to their need to refine their opportunity and prepare for its pursuit after firm foundation. This further illustrates the tendency of NBGs to employ reactive behavior by postponing many pursuit activities to after firm foundation.

In July 2012 we founded the company. So the [formation] process itself began a few months prior to that. (NBG:C).

I think our first meeting was in July 2006, and the company was founded in December 2007. It was very very fast. (NBG:I).
These patterns were echoed by University One’s TTO, who stated that “generally, it [pre-foundation] takes around 3–6 months. [But], sometimes the spin-out may not immediately be created. The foundation of a spin-out may come after an initial phase that can be quite long.” Based on these findings, the following illustration (Figure 2) of the evolution of proactiveness in BG and NBG USOs was developed.

While the findings have highlighted significant differences in the pre-foundation proactiveness of BGs and NBGs, observing their evolution throughout pre-foundation also reveals that treating foundation as the first event in BGs’ life-cycle provides an inaccurate reflection of their true stage of development. Indeed, BGs reached foundation with much greater maturity and market readiness compared to NBGs.

**Discussion**

**Theoretical implications**

The study has investigated the evolution of proactiveness in BG and NBG USOs and its influence on their internationalization timing. Table 3 provides a synthesis of the study’s findings, and Figure 3 provides a summary of the key insights generated.

Contrary to prior assumptions of behavioral linearity, the findings portray proactiveness as a nonlinear process that begins during the earliest stages of pre-foundation both in BG and NBG USOs. In particular, BG USOs initially employed mainly reactive behavior, and then increased their proactiveness as the firm evolved. NBGs initially behaved proactively, and subsequently became more reactive as the firm aged. The study supports growing arguments in the literature that BGs’ early internationalization can involve both

![Figure 2. The evolution of proactiveness in BG and NBG USOs.](image-url)
proactiveness and reactivity (Ciravegna et al., 2018; Rovira Nordman & Melén, 2008). It advances this line of research by illustrating that BGs are indeed evolutionary entities (Madsen & Servais, 1997) and that their behavior does not remain constant overtime, aligning with wider entrepreneurship arguments that entrepreneurship is nonlinear (McMullen & Dimov, 2013) and that proactiveness can be manifested in high levels and low levels at different points in time (De Massis et al., 2014). The findings, however, illustrate that firms do not necessarily decrease their proactiveness as they age and become more routinized (De Massis et al., 2014). Some firms, such as BGs, begin their journey through reactivity and increase their proactiveness

Table 3. Synthesis of key findings.

<table>
<thead>
<tr>
<th></th>
<th>Opportunity Identification</th>
<th>Opportunity Pursuit</th>
<th>Behavioral Evolution over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born Globals</td>
<td>BGs identified opportunities through reactivity by discovering opportunities through serendipity, chance, alertness to external stimuli and social network intervention.</td>
<td>BGs pursued opportunities proactively by committing time and effort to the opportunity, engaging in dedicated learning of entrepreneurial skills and market dynamics, creating and leveraging social networks, and identifying clients early.</td>
<td>Proactive behavior in BGs was nonlinear, with BGs initially behaving reactively and gradually behaving more proactively as the firm developed. BGs tended to experience longer pre-foundation periods.</td>
</tr>
<tr>
<td>Non-Born Globals</td>
<td>NBGs identified opportunities proactively by creating opportunities through active search efforts to identify market gaps and to develop/professional technologies to target gaps.</td>
<td>NBGs pursued opportunities reactively by devoting limited effort to the opportunity, delaying venture preparation for market and problem resolution, and identifying clients late.</td>
<td>Proactive behavior in NBGs was nonlinear, with NBGs initially behaving proactively and gradually behaving more reactively as the firm developed. NBGs tended to experience shorter pre-foundation periods.</td>
</tr>
</tbody>
</table>

Figure 3. Illustration of key findings on proactiveness in born global USOs.
as they evolve and become more committed to the opportunity. They also show that NBGs begin their journey with high-levels of proactiveness, which gradually decrease as the firm faces the challenges of opportunity pursuit.

The findings highlight two key processes during which proactive behavior prominently manifests itself: opportunity identification and opportunity pursuit. During opportunity identification, BGs behaved reactively by discovering opportunities in response to serendipitous external stimuli. This process enabled them to identify opportunities that were unmet by rivals. NBGs behaved proactively by engaging in a process of opportunity creation, which entailed a time-consuming search for market information, higher levels of uncertainty regarding market attractiveness, and continuous opportunity refinement. The lengthy and uncertain nature of this process often resulted in NBGs identifying opportunities that were unattractive and/or crowded by market rivals. Contrary to traditional arguments (McDougall et al., 2003), these findings suggest that BGs may identify opportunities through reactive actions (Sharma & Blomstermo, 2003), highlighting the role of chance and serendipity in BG internationalization (Ciravegna et al., 2018). For example, BG entrepreneurs may internationalize in reaction to unexpected orders from abroad (Leonidou et al., 2007), or by being alert to external changes and opportunities (Kirzner, 1979). In particular, the findings illustrate that through unsolicited orders and alertness, BGs avoided many of the costs typically associated with proactiveness, such as high search and learning costs (Sapienza et al., 2005). They also bypassed many of the steps typically involved in internationalization, such as identifying potential buyers and convincing them to purchase the offering (Hennart, 2014), as customers already possessed familiarity with the technology (Fan & Phan, 2007).

These findings also add to an important debate in the wider entrepreneurship literature on opportunity creation and discovery, where they are largely viewed as opposing ontological perspectives on opportunity identification. Discovery reflects the identification of exogenous opportunities that objectively exist in society and that await to be found (Shu et al., 2018). Creation reflects the identification of endogenous opportunities that are constructed within entrepreneurs’ minds and that do not exist outside of their perceptions (Aldrich & Kenworthy, 1999). Scholars have highlighted significant limitations in employing these mutually exclusive perspectives, suggesting that they are complementary modalities (Vaghely & Julien, 2010; Valliere, 2013). The findings align with this view, illustrating that the processes involved in discovery differed from those involved in creation (Alvarez et al., 2013) and led to different internationalization timing outcomes. Key differences were the uncertainty and time involved in each modality. The discovery process has predictable outcomes in terms of revenue-generation (Alvarez et al., 2013). For example, most BGs were certain about the presence of market demand because they discovered an unmet gap, which implied an absence of market rivals and
supported the achievement of first-mover advantages. This ultimately helped BGs to rapidly progress to opportunity pursuit during pre-foundation. Conversely, opportunity creation entailed higher levels of situational uncertainty. This stemmed from the combination of firm offerings and the availability of imperfect market information (Autio et al., 2011), such as entrepreneurs’ own beliefs about the opportunities and their ability to pursue them (Baker & Nelson, 2005). This generated uncertain revenue-generation expectations, with the appropriate course of action not being immediately apparent (Zander et al., 2015), triggering gradual progression toward defining the opportunity. Creation entrepreneurs awaited a response from the market, adjusted their beliefs, and then acted again (Alvarez et al., 2013), a pattern reflected in their continuous opportunity refinement even after foundation.

The findings also reveal that, as USOs progressed to venture preparation and opportunity pursuit, BGs became more proactive and NBGs became more reactive. They support arguments that acting in anticipatory and proactive ways when pursuing opportunities supports early internationalization (Jiang et al., 2020). They also illustrate the variety of activities involved in proactive pursuit (Randerson, 2016), including business skill and plan development, increasing commitment to the venture and gaining competitive awareness. Key to these processes were BGs’ dedicated learning efforts and proactive engagement with external networks. BGs were able to overcome internal constraints, such as limited entrepreneurial skills and experience, through stronger resource recombination capabilities (Knight & Liesch, 2016) and effective learning (Zhou & Wu, 2014). Vicarious learning emerged as particularly important, reflecting a firms’ indirect learning from network partners, for example, through emulation, that in turn triggers a change in firm behavior (Monaghan & Tippmann, 2018). To achieve this, BGs devoted efforts to identifying suitable partners to imitate, and proactively integrated new knowledge into their routines (Hahn et al., 2019). This enabled BGs to access the resources, expertise and heritage of network partners and shaped their entrepreneurial approach, increasing their readiness for market and internationalization. NBGs’ reactive behavior, by contrast, resulted in lower network engagement and levels of learning, supporting arguments that inadequate learning and knowledge can reduce market readiness and slow down internationalization (Monaghan & Tippmann, 2018).

The study’s findings must be considered in relation to the USO context. USOs share many characteristics with the wider category of BGs. Both categories target international markets from inception as a preferred growth strategy (Cumming et al., 2009), are founded by individuals with advanced technological skills (Teixeira & Coimbra, 2014), and primarily operate in industries with short windows of opportunity and rapidly evolving competitive dynamics (Prashantham & Young, 2011). USOs, however, are also distinctive due to their academic origins and, as such, may pose theoretical challenges when extending insights to the wider BG literature. For example, through their academic ties, USOs
can leverage their parent institution and other ecosystem partners (Messina et al., 2020) to access resources, market information, brand name and reputation (Schulz et al., 2009). Arguably, this can help them compensate for their lack of entrepreneurial experience and skills, and can influence the levels of proactiveness they need to overcome their liabilities of newness and smallness (Grandi & Grimaldi, 2003). USOs, however, are also rather homogeneous in their entrepreneurial pre-conditions such as founder background and experience, environmental conditions, and social networks (Taheri & van Geenhuizen, 2011). As such, the study’s sample included comparable firms in terms of their access to networks and their benefits. Whether the firms benefited from networks depended on the entrepreneurial efforts of the individual firms. Such contextual homogeneity provided unique opportunities to advance BG research by employing samples of comparable firms (for example, Al-Laham & Souitaris, 2008).

The USO context also provided the opportunity to evaluate firms’ pre-foundation. Both BGs and USOs, it has been argued, possess longer organizational histories than previously assumed (Rasmussen et al., 2011; Zahra, 2005), with their pre-foundation periods being identified as critical to their ability to internationalize early (Hewerdine & Welch, 2013). The findings illustrate that BGs tended to delay firm foundation until all the necessary elements for a successful market entry were in place (Nikiforou et al., 2018). Despite the majority of academic founders initially lacking the competencies to manage the entrepreneurial process (Lockett et al., 2005), BG founders accumulated knowledge, skills and competitive awareness to reduced their perceived market-related ignorance (Choi et al., 2008) during pre-foundation. This enabled BGs to sustain higher levels of proactiveness as the firm evolved and to internationalize shortly after foundation. NBGs were reactive during venture preparation by postponing all the necessary activities to after firm foundation, which took place soon after business idea conception. As such, they founded the firms while perceiving high-levels of market-related ignorance (Choi et al., 2008). These findings align with Hewerdine and Welch (2013) and Zahra’s (2005) conclusions that the processes leading to early internationalization begin before and during foundation, and not exclusively at or shortly after it. The findings also agree with Björnåli and Aspelund (2012) that many firms are established before they are “ready for market,” which in turn influences internationalization timing. As such, the study further supports calls to focus on market readiness and firm maturity, rather than official foundation, as a reflection of firm age.

Managerial implications

This study has important practical and policy implications. It suggests that, to accelerate internationalization, firms should be founded only once the firm is ready for market. In particular, it signals the need for policy makers and market agencies to support internationalization efforts before firm
establishment, from the moment of business idea conception. Most importantly, the study highlights that, to internationalize early, firms do not need to sustain high-levels of proactiveness over time; rather, a well-balanced combination of reactiveness during opportunity identification and proactiveness during opportunity pursuit is most appropriate.

Limitations and directions for future research

The study has limitations that highlight opportunities for future research. First, a phenomenological qualitative approach was employed to yield rich process-based insights on a past phenomenon. As it involved a limited number of retrospective interviews, data may be affected by retrospective bias and generalizations of the findings to the wider BG population are not possible. Future studies could test finding generalizability on a larger population. Second, USOs in Italy were selected as an interesting context due to the opportunities they presented for BG theoretical development. BGs in other contexts, however, may not adopt the same behavior, warranting further investigation into other unique BG contexts where the firms are comparable. Third, the study only focuses on the timing of internationalization as the most distinctive feature of BGs. Future research could examine the role of pre-foundation proactiveness as an antecedent of other BG outcomes such as scale, scope and performance. Finally, the conceptual foundation of the paper rests on well-established contributions on early and gradual internationalization. As noted in previous research (for example, Paul, 2020; Paul & Rosado-Serrano, 2019), further theoretical development is needed in IE research through the adoption of more recent, under-explored conceptual frameworks. Three promising models to advance IE research are identified: the theoretical model of conservative, predictable and pacemaker markets (CPP) (Paul & Sánchez-Morcilio, 2019); the 7-P framework for international marketing (Paul & Mas, 2020); and the SCOPE framework (Paul, 2020).

The CPP model (Paul & Sánchez-Morcilio, 2019) is a three-dimensional typology that reflects three types of firms based on their international behavior: conservative firms, which exclusively operate within one country; predictable firms, which operate and generate substantial revenue within legally integrated countries with no institutional distance; and pacemaker firms, which generate substantial revenue from the global market and at a high pace. Distinguishing firms based on the geographic spread of their international activities would enable researchers to highlight the changes required to shift from lower to higher risk approaches to internationalization. The 7-P framework for international marketing (Paul & Mas, 2020) and the SCOPE framework (Paul, 2020) are analytical tools that identify the critical dimensions of firms’ internationalization strategies and processes. The 7-P framework identifies seven dimensions of marketing that entrepreneurs
should use to perform thorough analyses of target markets; these are potential, path, process, pace, pattern, problems and performance. The SCOPE framework (Paul, 2020) aims at identifying the opportunities and risks involved in international markets through analyses along five dimensions: strategies, challenges, opportunities, problems, and exporting and internationalization (Paul, 2020). By using these frameworks, researchers can develop new firm typologies and generate intuitive insights to support firms’ internationalization efforts (Chandra et al., 2020).

**Conclusion**

By exploring the evolution of proactiveness from pre-foundation and capturing its influence on internationalization timing, the study enriches knowledge on entrepreneurial behavior in BGs and NBGs. In particular, the study illustrates that entrepreneurial behavior changed over time in both BGs and NBGs, with both categories manifesting high levels and low levels of proactiveness at different points in time. These insights advance knowledge on the evolutionary nature of BGs (Madsen & Servais, 1997) and proactiveness (De Massis et al., 2014), and on how changes in proactiveness over time influence internationalization timing. By focusing on USOs, the study also contributes to BG research employing samples of comparable firms (Al-Laham & Souitaris, 2008), responding to calls for studies to regard BGs as heterogeneous firms whose behavior is contingent on their context (Rovira Nordman & Melén, 2008). The study shows that, despite contextual constraints, through proactive efforts of learning and network exploitation, BG USOs were able to reconfigure their entrepreneurial behavior during pre-foundation (Vanaelst et al., 2006) and internationalize early. NBG USOs employed reactive behavior toward learning and network engagement, reaching foundation with poor market readiness and delaying internationalization. Finally, the study adds important insights into the influence of firms’ organizational histories on BGs’ ability to internationalize early (Hewerdine & Welch, 2013), identifying firm market readiness at foundation as a key determinant of internationalization timing.

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