



The role of non-economic goals in academic spin-offs

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Accepted: 14 June 2024
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Abstract

Acting as a crucial link between academia and the business world, Academic Spin-Offs (ASOs) play a key role in translating innovative technologies from academic discoveries into commercial applications. Despite their potential for technological advancements, ASOs often struggle with challenges in financial performance and growth. Traditional explanations attribute these challenges to a lack of commercial resources and competencies. However, since ASOs often demonstrate prolonged survival, such explanations may not fully explain the paradox in ASOs' outcomes. This paper offers a novel perspective, highlighting how non-economic goals, deeply ingrained in the academic context in which ASOs originate, shape their behavior and outcomes. These goals, related to the dimensions of control, identity, and emotions, go beyond financial gains, reflecting concerns that are specific to the academic environment. Integrating the organizational goals literature with insights from academic entrepreneurship research, we present a conceptual model describing the origins and nature of these goals and explain how they can help shedding light on some paradoxes in ASOs' development, growth, and performance events. Our model bears significant implications for the academic entrepreneurship literature and related public policy.

Keywords Academic entrepreneurship · Academic spin-offs · Non-economic goals · Outcomes

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1 Introduction

Academic spin-offs (ASOs) are new ventures initiated by academic scientists to commercialize technologies that originate from their discoveries (Markman et al., 2008; Wood, 2009; Wright et al., 2018). These ventures bridge academia and business, facilitating knowledge transfer from research institutions to the market (Klofsten & Jones-Evans, 2000). Despite frequently leading in technological and scientific advancements, ASOs paradoxically appear less impressive in the commercial realms. Indeed, several studies illustrate that ASOs often financially underperform in comparison to corporate spin-offs (Zahra et al., 2007; Wennberg et al., 2011), startups (Modina et al., 2023), and new technology-based firms (Ensley & Hmieleski, 2005). Moreover, ASOs report fewer liquidity events (Roche et al., 2020) and regularly face hurdles in scaling their ventures (Schou, 2023).

The prevailing explanation for this paradox posits that ASOs struggle with commercial challenges despite their technological prowess (Colombo & Piva, 2012). Academic founders, rooted in academia, are perceived to lack essential business knowledge and industry experience, primarily due to their limited exposure to the private sector (Chiesa & Piccaluga, 2000). Amplifying this challenge are the difficulties ASOs face in recruiting commercial expertise and their tendency to form homogeneous teams primarily comprised of academic personnel, excluding external professionals (Ensley & Hmieleski, 2005; Clarysse et al., 2007; Hayter, 2016; Woolley, 2017). Consequently, prior research tends to ascribe ASOs' poorer financial performance to founders' limited experience in business and their lack of resources and competencies in facing the challenges inherent in incorporating external commercial knowledge (Wright, 2014; Rasmussen et al., 2015; Rasmussen & Wright, 2015).

In this paper, we contest such prevailing assumptions. Our central argument diverges from the notion that ASOs' outcomes relative to similar firms solely arises from their founders' lack of adequate competencies. Such an explanation, in fact, seems incompatible with empirical evidence showing that ASOs are capable of achieving better performance in terms of survival or internationalization (Criaco et al., 2014; Civera et al., 2019). Instead, we posit that ASOs tend to prioritize non-economic goals stemming from their academic founders' motivations, which are deeply rooted in academic identities, that oftentimes overshadow pure economic pursuits. In the literature on organizational goals, non-economic goals describe desired outcomes for the organization that are not directly related to financial gain or profit, reflecting the interests and concerns of the firm's dominant coalition (Kotlar et al., 2018), namely academic founders in the case of ASOs (Ensley & Hmieleski, 2005). Departing from the literature that draws on the multifaceted motivations underpinning academic founders' decision to initiate ASOs, we emphasize the profound impact on ASOs' outcomes of non-economic goals—closely tied to their founders' scientific background (Hayter et al., 2022; Wang et al., 2022; Clarysse et al., 2023), motivations (Civera et al., 2024), and social embeddedness in academia (Kenney & Goe, 2004). In doing so, we present arguments that aid in understanding the distinctions between ASOs and other high-tech firms, elucidating their connection to certain paradoxes and inconsistencies in the literature.

Our work offers two main contributions to the literature. First, our framework moves the focus of the academic entrepreneurship literature from academic entrepreneurs' individual non-pecuniary motives to the consequences of non-economic goals on firm-level outcomes (Abootorabi et al., 2023; Clarysse et al., 2023). Understanding the role of non-economic

goals offers a more nuanced lens through which to examine ASO outcomes. It shifts the conversation from mere economic drivers to the consideration of non-economic goals (Pilegaard et al., 2010; Sauermann & Stephan, 2013; Perkmann et al., 2019) arising from the academic context (Spanò et al., 2022; Schou, 2023). Second, by showing how non-economic goals can lead to both positive and negative implications for ASO performance, our framework advances the theoretical understanding of the field, providing a novel perspective that helps explain existing puzzles in academic entrepreneurship and uncovers patterns through which ASOs can unleash their potential. Additionally, our research has implications for policymaking and university managerial practices that traditionally revolve around the creation of ASOs (Muscio et al., 2016; Sandström et al., 2018; Åstebro et al., 2019). We argue for a more nuanced approach, one that acknowledges the complex implications of non-economic goals in shaping ASO outcomes.

2 Background literature

2.1 Academic entrepreneurship

Since the seminal work of Klofsten and Jones-Evans (2000), the topics of science commercialization and academic entrepreneurship have been attracting a growing number of scholarly contributions over the past 30 years (Rothaermel et al., 2007; Djokovic & Souitaris, 2008; Siegel & Wright, 2015; Fini et al., 2018; Wright & Phan, 2018; Arroyabe et al., 2022). Because of ASOs' impact on regional innovation ecosystems and employment (Etzkowitz & Klofsten, 2005; Czarnitzki et al., 2014), policy makers and governmental bodies also have focused their attention on this phenomenon, designing a wide range of initiatives to spur entrepreneurship among academics (see Sandström et al., 2018, for a review).

Scholars have examined various aspects of this growing field (Colombo et al., 2019; Mathisen & Rasmussen, 2019; Hahn et al., 2024). In recent years, it has been evolving from a predominantly descriptive field to one characterized by a heightened emphasis on theoretical development (Wright, 2014; Siegel & Wright, 2015; Hmieleski & Powell, 2018). This evolution has served as a catalyst for reevaluation, prompting scholars to seek deeper insights that can move the field forward.

Amidst the quest for theoretical enrichment, a critical dimension emerges in these firms—one that transcends traditional economic-centric narratives (Morales-Gualdrón et al., 2009; Hayter, 2011, 2015; Lam, 2011; Balven et al., 2018; Galati et al., 2020; Hossinger et al., 2021; Civera et al., 2024) and emphasizes that the non-economic concerns of academic founders play a pivotal role in shaping the atypical outcomes observed in ASOs. A series of findings, ranging from the absence of experienced entrepreneurs in founding teams (Clarysse & Moray, 2004) to the persistence of ASOs notwithstanding poor financial performance (Criaco et al., 2014), reveals a complex picture. Despite their groundbreaking innovation potential (Bonardo et al., 2010; Hesse & Sternberg, 2016), ASOs have shown little growth or scaling and few acquisitions, leading to questions regarding the motivations of these ventures' founders (Civera et al., 2020). Notably, the literature highlights a tendency for ASOs to prioritize the recruitment of younger researchers over individuals with commercial skills, emphasizing a potential misalignment between academic principles and the commercial imperatives necessary for business success (Horta et al., 2016). Furthermore,

the emphasis on attracting funding for research projects, in contrast to investor expectations of a focus on fundamental business viability, suggests a gap that current theories fail to adequately address (Casati & Genet, 2014).

This recognition prompts a departure from conventional perspectives, urging a closer examination of the motives driving academic entrepreneurs and shaping ASOs' unique trajectories. In this context, the literature calls for a paradigm shift, redirecting scholarly attention toward understanding the complex interplay between the motivations of academic founders and the distinct outcomes observed in academic entrepreneurship. As Wright and Phan (2018, p. 2) assert, "The notion that academic entrepreneurs are driven by non-pecuniary motives is probably more salient than our theories have allowed." This statement underscores the urgency of linking non-economic concerns with the distinct behavioral patterns and outcomes observed in ASOs.

2.2 A review of the economic and non-economic motives of ASOs' founders

In recent decades, research has increasingly acknowledged that academics have motivations other than financial incentives when starting ASOs (Åstebro et al., 2013; Galati et al., 2020; Civera et al., 2024). Scholars have thus converged in a taxonomy of academic entrepreneurial motivations that distinguishes pecuniary from non-pecuniary motivations (Rizzo, 2015; Iorio et al., 2017; Galati et al., 2020). Pecuniary motivations are associated with the personal financial gain academic founders can derive from commercializing their discoveries via ASOs (Lam, 2011; Hossinger et al., 2021). Though they play a role for some academics, such motivations are generally not predominant among academic founders (Morales-Gualdrón et al., 2009; Hayter, 2011; Galati et al., 2020). The opportunity costs associated with venture creation are in fact substantial in the academic profession, even for those academic founders who are able to make money from ASOs (Hayter, 2015). Moreover, even when pecuniary motivations are present, they generally come with some non-pecuniary motivations (Lam, 2011). In this respect, there are different non-pecuniary motives specific to academic entrepreneurs: *puzzle*, *ribbon* (Lam, 2011), and *mission* (Iorio et al., 2017); these motives recur in several taxonomies of academic motives present in the literature (Morales-Gualdrón et al., 2009; Galati et al., 2020).

Puzzle describes the intrinsic reward obtained from problem-solving activities and knowledge application (Morales-Gualdrón et al., 2009; Hossinger et al., 2021). Some academic founders engage in venture creation primarily because they are stimulated by the intellectual curiosity that characterizes the scientific profession and stimulates the search for new ways to apply knowledge and solve problems (Lam, 2011). Conversely, *ribbon* describes extrinsic rewards associated with the academic career, such as reputation and additional resources for research (Fini et al., 2009; Hayter, 2015; Rizzo, 2015). Empirical evidence suggests that academics often establish ASOs not because of entrepreneurial opportunities but due to necessity (Civera et al., 2020). Some academic founders seek extra resources beyond the university environment to advance their research and technologies (Morales-Gualdrón et al., 2009; Hayter, 2011) or aim to secure employment opportunities for their research team members (Rizzo, 2015; Dorner et al., 2017). Others engage in spin-off activities to gain potential recognition for entrepreneurship by their academic peers (Stuart & Ding, 2006; Bercovitz & Feldman, 2008). Finally, *mission* describes rewards obtained by contributing to the social good through technological diffusion and knowledge

application (Iorio et al., 2017; Galati et al., 2020; Hossinger et al., 2021). Some academic founders view their involvement in ASOs as a means to serve society and fulfill their role as civil servants connected to the scientific profession (Jain et al., 2009; Civera et al., 2020; Clarysse et al., 2023).

In summary, scholars widely acknowledge the importance of various non-pecuniary motivations specific to the scientific profession, influencing academic founders to establish ASOs. These motives are crucial not only in explaining individuals' decisions to establish ASOs but also in driving the outcomes of ASOs, such as performance (Civera et al., 2024). However, as motives are inherently personal values, they have been predominantly studied at the individual level in the literature (Lam, 2011; Hayter, 2015). Consequently, there is limited understanding of how these diverse motives permeate the organization and influence ASOs after founding, spanning organizational goals and outcomes unique to ASOs. This gap extends beyond the entry phase, encompassing the launch and developmental stages of the firm's lifecycle (Ndonzuau et al., 2002; Vanaelst et al., 2006).

The heterogeneity of non-economic motives, moreover, may be a potential cause of the puzzling performance patterns in ASOs, often characterized by longer survival rates but lower growth rates (Civera et al., 2020, 2024). These gaps are critical for comprehending ASOs' post-entry outcomes, as founders' personal motives for creating organizations typically have lasting implications on organizational trajectories (Kimberly & Miles, 1980). In the case of ASOs, the scientific values of academic founders are ingrained in the firms they start, imprinting distinctive post-entry behaviors and influencing organizational decision-making (Colombo & Piva, 2012; Hahn et al., 2019). This phenomenon is likely amplified in ASOs because founders often remain embedded in the academic context even after firm establishment (Galati et al., 2020). As a result, non-pecuniary motivations linked to founders' academic embeddedness persist in influencing ASOs (Bienkowska & Klofsten, 2012). Therefore, the continuous embeddedness of ASOs in academia is a crucial contingency that can shed light on their goals and post-entry outcomes, deserving more attention in the literature.

3 Theoretical development

3.1 Economic and non-economic organizational goals

Since the seminal work of Cyert and March (1963), the literature on organizational goals has extensively examined how organizations establish and pursue diverse goals, exploring their subsequent influence on firm behaviors (Kotlar et al., 2018). Internal organizational goals emanate from the individual motives of the members constituting the organization's dominant coalition (Connolly et al., 1980; Dew et al., 2008).¹ The dominant coalition includes actors with a vested interest in the firm's activities and the greatest ability to influence them (Greve, 2003). In the case of ASOs, the dominant coalition is typically constituted by academic founders (Ensley & Hmieleski, 2005).

¹ In their framework, Kotlar and colleagues (2018) differentiate between external and internal goals. External goals mirror the interests and concerns of external stakeholders, whereas internal goals align with the interests of the coalitions within the firm. Our paper specifically focuses on internal goals, exploring the consequences of non-pecuniary concerns of ASOs' decision-makers on the outcomes of ASOs.

Contrary to the initial assumption of classical economic theorists that firms are solely driven by profit maximization (Simon, 1959), organization theorists argue that firms harbor both economic and non-economic goals. These goals reflect the varied interests of the actors involved in the firm (Debicki et al., 2016). Recently, there has been a notable surge in interest in the role of non-financial or non-economic goals within management research (Gomez-Mejia et al., 2011; Kotlar et al., 2018; Gaba & Greve, 2019; Vedula et al., 2022; Abootorabi et al., 2023). Given that the individual beliefs and motives shaping the goals of a dominant coalition arise from strong ties within a group (Homans, 1950), recognizing the social embeddedness of actors becomes crucial. Social embeddedness refers to their social ties, involving the exchange of information, ideas, and values that shape perceptions and actions (Granovetter, 1985). This social embeddedness is an important consideration when theorizing about firms' goals.

In the subsequent sections, we first discuss the social embeddedness of ASO founders in both academia and business. We then conceptualize the consequences of such embeddedness on the economic and non-economic goals pursued by ASOs. Finally, we direct our attention to the distinctive non-economic goals characterizing ASOs, rooted in the founders' embeddedness in academia.

3.2 ASOs as socially embedded organizations

In this section, we conceptualize ASOs as organizations in which key decision-makers, namely academic founders, are simultaneously embedded in two distinct social systems, each with its own defining norms and values: academia and business (Stuart & Ding, 2006; Shibayama et al., 2012). ASOs, like other innovative ventures, are embedded in the business system, shaping the norms and behaviors that facilitate efficient operations and economic value generation. Founders become embedded in the business system through owning and running a firm. This embeddedness fosters logics around risk-taking and outward-looking attitudes toward commercialization (Fini & Toschi, 2016).

What sets ASOs and their goals apart from other innovative ventures is the founders' distinct embeddedness in academia. Academia functions as a social system driven by "the collaborative production of knowledge through research" (Stenhouse, 1979, p. 108), where academics "accumulate social status by having the novelty and originality of their openly published work acknowledged by their peers" (Perkmann, 2016, pp. 1–2). Academics are typically embedded in academia through their affiliation and participation in academic departments and disciplines (Kenney & Goe, 2004). This embeddedness fosters logics centered around the universality of scientific knowledge, communality, and skepticism (Fini & Toschi, 2016). Since ASO founders often remain embedded in the academic context even after establishing ASOs and typically represent the dominant coalition in ASOs, the influence of academia on the outcomes pursued by ASO decision-makers persists post-founding (Hayter, 2015; Galati et al., 2020).

Consequently, the simultaneous belonging of the ASO's dominant coalition to both academia and the business system contributes to the presence of multiple goals in these organizations. These goals, in turn, impact their priorities and decision-making behavior (Spanò et al., 2022; Schou, 2023). Research emphasizes the hybrid nature of ASOs' goal structure (Abootorabi et al., 2023; Engzell et al., 2024), as they simultaneously pursue economic and non-economic goals. Additionally, the emphasis on economic and non-economic goals

differs among ASOs (Clarysse et al., 2023). Similar to other hybrid organizations, ASOs pursue economic goals to some degree (Abootorabi et al., 2023). However, what sets these firms apart from other innovative ventures is their founders' embeddedness in academia, leading to the pursuit of distinctive non-economic goals rooted in the academic setting (Nikiforou et al., 2018). Thus, while recognizing the presence of economic goals in ASOs, our conceptualization highlights the distinctive role of non-economic goals in these firms. We contend that the non-economic goals of ASOs are responsible for producing outcomes that previous research has not fully explained.

3.3 Non-economic goals in ASOs

To explain the distinct nature of organizational goals in ASOs, we draw upon the framework provided by Kotlar et al. (2018). This framework defines three content dimensions of internal, non-economic goals: control, identity, and emotions. *Control* entails the pursuit of non-economic utility derived from maintaining continuous control and exercising authority over the strategic decisions of the business by members of the firm's dominant coalition. *Identity* involves the pursuit of non-economic utility derived from the close identification of coalition members with the firm, viewing it as an extension of the coalition's social group. *Emotions* refer to the pursuit of non-economic utility derived from fulfilling affective needs related to reciprocal attraction, encompassing desires for belonging, closeness, affect, and intimacy. Departing from this classification of internal, non-economic organizational goals' content dimensions, we leverage insights from the academic entrepreneurship literature to illustrate how the pursuit of control, identity, and emotions manifests in the specific case of ASOs.

3.3.1 Control

The first content dimension of ASOs' non-economic goals centers around the pursuit of control. Control is a distinctive aspect of ASOs, as their academic founders (often in collaboration with their universities) intentionally choose the spin-off as the organizational form for commercializing their discoveries, as opposed to alternative forms, such as technology license agreements. The creation of a spin-off firm gives academic founders (and, at times, the university) control over significant asset-specific investments and the firm's day-to-day operations (Wood, 2009; Knockaert et al., 2011).

While academic founders can undoubtedly use the ASO as a vehicle for economic gain, evidenced by the financial benefits accruing from commercializing their discoveries, the literature highlights a substantial amount of non-economic benefits associated with control over the ASO. This idea is reflected in studies exploring why academics opt to initiate ASOs in the first place (D'Este & Perkmann, 2011; Meoli & Vismara, 2016; Hossinger et al., 2021; Wang et al., 2022). By exercising control over the ASO, academic founders gain greater influence to obtain both intrinsic and extrinsic rewards that motivate their involvement in ASOs.

Intrinsic rewards encompass the satisfaction derived from problem-solving and intellectual stimulation; it also allows academics to serve as custodians in transforming scientific discoveries into commercial applications (Jain et al., 2009; Hossinger et al., 2021). Additionally, intrinsic rewards include pride in the technological achievements that undergo

commercialization (Lam, 2011). As for extrinsic rewards, maintaining control empowers academic founders to leverage the ASO as a means to secure additional resources for research and their teams. Control over ASOs provides academic founders with the authority to obtain research-oriented funding (e.g., to accelerate academic discoveries) through dedicated ASO activities, such as contract research (Hayter, 2015). It also enables them to attract resources by promoting the diffusion of technological advancements (Rotolo et al., 2022) and creating valuable job opportunities for junior members of their research team (Fini et al., 2009; Rizzo, 2015).

3.3.2 Identity

The second content dimension of ASOs' non-economic goals revolves around the pursuit of a close identification of the dominant coalition with the firm, linking the identity of the coalition to the organization. Founders exhibit a tendency to align their firms' activities with the social group they identify with, as observed in other innovative ventures (e.g., Fauchart & Gruber, 2011). In the case of ASOs, academic entrepreneurs oftentimes perceive the company as an extension of a well-defined social group, such as the scientific community, research group, department, or institution to which they belong (Jain et al., 2009; O'Kane et al., 2015; Meek & Wood, 2016). For example, the name of the ASO often contains acronyms of the name of the parent university or research team, or of the underlying commercialized technology; moreover, the name of the parent university is often communicated by the spin-off to its broader stakeholders (Salvador, 2011).

This close identification of the dominant coalition with the firm yields specific non-economic benefits linked to some of the non-pecuniary motivations that drive academic founders to establish ASOs in the first place. Notably, aligning ASO activities with the values and norms characterizing academic identity allows academic founders to fulfill two interconnected non-pecuniary motivations underlying ASO creation. The first involves enhancing reputation within the academic community. Academic entrepreneurs derive non-economic benefits by operating ASOs in a manner that upholds the image of their research group, a key dimension of ASO success (Hayter, 2011). Concerns about the external stakeholders' perception are common, as the reputation of the research team and university can be adversely affected if the ASO acts inappropriately (Shane, 2004; Slaughter & Rhoades, 2004). Successful ASOs can also contribute positively to the reputation of their universities, generating reputational spillovers (Pitsakis et al., 2015). Pursuing non-economic benefits associated with high identification prompts ASOs to take specific initiatives to enhance the firm's image and reputation in the scientific community, such as publishing (Rotolo et al., 2022) and allocating resources to benefit the parent university (Spanò et al., 2022). The second non-pecuniary motivation involves addressing societal challenges (Iorio et al., 2017). Some academic entrepreneurs recognize ASOs as a vehicle through which their university and the scholarly community can achieve a broader societal impact by commercializing research discoveries for the social good (Jain et al., 2009; Fini et al., 2018). ASOs may adjust business plans to address social goals related to the environment, health, and safety (Abootorabi et al., 2023) or to prioritize the social good as a main frame of reference (Clarysse et al., 2023). These decisions significantly influence ASO development, shaping choices related to governance and growth.

In summary, academic founders derive personal benefits from their involvement in the ASO in terms of identity consistency, designing firm decision-making to maximize academic/institutional reputation, and subsequent well-being. This involvement may lead to decisions benefiting the ASO's internal and external stakeholders, promoting and legitimizing ASO activities within the research community, and/or leveraging the ASO's resources to generate publicly relevant research outputs (such as publications and patents) for the scientific field (Jain et al., 2009; D'Este & Perkmann, 2011).

3.3.3 Emotions

The third content dimension of non-economic goals in ASOs involves affective content, focusing on the pursuit of emotions in the organizational context. As proposed by Vandenberghe et al. (2017), affective commitment reflects an emotional attachment to a target resulting from an identification with it; this commitment can be directed toward constituencies, such as organizations. In this context, the company becomes a place where needs for belonging and affect are satisfied, particularly for members belonging to the firm dominant coalition's social group.

At the individual level, academic founders often view the ASO as a vehicle to pursue scientific passion (Huyghe et al., 2016). At the team level, the ASO team often includes researchers from the original research group, possessing deep knowledge of the underlying technology and shared working experiences with the ASO's founders (Adamides & Karfaki, 2022). In intrinsically motivated scientists, greater engagement with the venture is likely, involving more substantial participation and greater emotional commitment (Knockaert et al., 2011).

Emotions permeate ASOs due to the shared experiences constituting the organization (Ashkanasy et al., 2017). Relationships among organizational members are emotionally loaded, reflecting the warmth, solidarity and complicity derived from shared passion; meanwhile, anger, rivalry, and resentment may result from the challenges and conflicts associated with academic work and collaboration (e.g., Fox et al., 2011; Casati & Genet, 2014; Engzell et al., 2024). For instance, Ensley and Hmieleski (2005) find that ASOs' top management teams display more relationship conflicts than their non-ASO counterparts. However, these conflictive relationships, which engender negative emotions, are less likely to lead to firm closure in ASOs compared to other young high-technology firms, due to the hope that these relationships will eventually become harmonious (e.g., Vanaelst et al., 2006). Indeed, academics' attachment to the firm and its members facilitates self-continuity, connecting memories of past experiences, present efforts, and future expectations (Kleine et al., 1995). The pursuit of emotions connected to the preservation of the research team sometimes manifests even in the motivation underlying the establishment of some ASOs: securing resources and creating stable job opportunities (Lam, 2011; Rizzo, 2015).

Given the often blurred boundaries between the firm and the academic founding team in ASOs, the pursuit of non-economic benefits derived from emotional content permeates the organization and influences its decision-making (Baron, 2008). This influence can result in distinctive behaviors and preferences across various organizational processes and outcomes. For example, the adoption of monitoring and incentive mechanisms tends to be informal, privileging personal relationships based on long-time mentoring and/or friendships developed in the academic context. Moreover, academic founders might use the ASO as a vehicle

to pursue a scientific agenda, attracting research-driven funds and generating publications instead of solely focusing on growth (Clarysse et al., 2023). These ideas are presented in Table 1, which summarizes the three content dimensions of internal non-economic goals for ASOs and provides illustrative examples.

4 Implications of non-economic goals for ASOs' outcomes

Integrating insights from the academic entrepreneurship and organizational goals literatures, we argue that ASOs exhibit rational decision-making similar to other firms. Nevertheless, in ASOs, the criteria for evaluating decisions are frequently guided by an additional, central frame of reference—the aspiration to safeguard and enhance the non-economic benefits of the dominant coalition, which are rooted in control over, identification with, and emotional investment in the firm (cf., Gomez-Mejia et al., 2011). As depicted in Fig. 1, ASOs have non-economic goals that originate from their social embeddedness in both the business system and academia. These goals further impact post-entry outcomes. In the following sections, we will illustrate how applying these considerations to the study of ASOs can enhance our understanding of some paradoxes present in academic entrepreneurship research.

To categorize ASOs' outcomes, we turn to the framework developed by Mathisen and Rasmussen (2019), who identify three distinct groups of outcomes in ASOs: (1) *develop-*

Table 1 Non-economic goals in ASOs

Non-economic Goal Content	Explanation	Non-economic Goals in ASOs	Examples
Control	Pursuit of organizational control through ownership and governance	ASOs prioritize control and authority as a means to achieve intrinsic and extrinsic organizational benefits.	Extrinsic benefit: Obtaining research-oriented funding and resources Intrinsic benefit: Problem-solving and pride in technological achievements
Identity	Pursuit of organizational identity and reputation	ASOs align activities with their academic identity to enhance the scientific reputation of the research group and fulfill the societal mission of the university.	Upholding the image of the research group Addressing societal challenges in line with the university's mission
Emotions	Pursuit of positive organizational climate and team continuity	ASOs aim to foster a positive emotional climate and cultivate team continuity for the organization's success.	Emotions linked to scientific passion Cultivating relationships within the research team for conflict tolerance and preservation of team memories

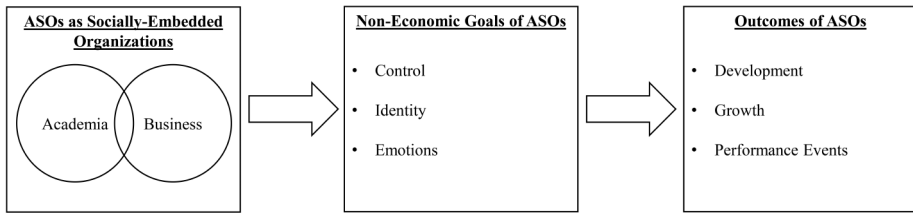


Fig. 1 Non-economic goals in ASOs: origins and outcomes

ment, encompassing capabilities, networks, milestones, processes, and business models; (2) *growth*, covering financial and employment dimensions; and (3) *performance events*, including survival and exit, financing, innovation, initial public offering and acquisition, and internationalization. Table 2 provides a summary of how these outcomes can relate to each content dimension of the non-economic goals identified earlier.

4.1 ASOs' development: capabilities and networks

Capabilities and networks are fundamental aspects of ASO development. Capabilities encompass the skills and knowledge within ASOs, while networks reflect the relationships ASOs establish with other startups, industry leaders, investors, and their parent universities (Mosey & Wright, 2007; Wright, 2014; Hayter, 2016). The composition of an ASO's team is vital for the development of both capabilities and networks. Research consistently highlights the importance of non-academic team members in ASOs, as they bring valuable contributions in terms of human and social capital (Vanaelst et al., 2006; Wright et al., 2007; Visintin & Pittino, 2014). However, ASOs often face challenges in recruiting non-academic members (Wright et al., 2018), as highlighted by prior findings showing that ASOs tend to have predominantly homogeneous teams, composed of academic personnel (e.g., Ensley & Hmieleski, 2005; Clarysse et al., 2007; Hayter, 2016; Woolley, 2017).

This apparent paradox in recruitment can be attributed to several factors. Firstly, academic founders often have limited connections to non-academic environments, making it challenging to identify and recruit suitable individuals (Franklin et al., 2001; Vohora et al., 2004; Mosey & Wright, 2007). Secondly, the complex technology base of ASOs can make it difficult for external non-academic managers to fully understand and evaluate the venture, leading to hesitance in joining these organizations (Hmieleski & Powell, 2018). Lastly, different perspectives on commercialization strategies can create conflicts between business professionals and ASOs, deterring non-academic individuals from engaging with these ventures (Nikiforou et al., 2018). Contrary to these common explanations for this recruitment pattern (i.e., ASOs do not have the *ability* to attract non-academic members), we propose that ASOs' tendency not to recruit external members may reflect a deliberate choice driven by the founders' commitment to maintaining academic control over the business (Nikiforou et al., 2018). This tendency aligns with the pursuit of non-economic goals, specifically the goal of maintaining control to preserve the associated non-economic benefits of the ASO. Evidence suggests that ASOs employ distinct governance mechanisms and structures to uphold control; for instance, they frequently appoint members of the research team responsible for the initial or ongoing development of the technology to formal or informal managerial roles within the organization (Vanaelst et al., 2006). In doing so, they exert formal and

Table 2 Using ASOs' non-economic goals to guide future research in academic entrepreneurship

	Development: capabilities and networks through team evolution	Growth	Performance events: exit, survival and internationalization
Control	<ul style="list-style-type: none"> • How does the research prominence of ASOs' team members influence their openness to sharing control within the organization? • To what extent does the university embeddedness of ASOs' founding team determine the autonomy granted to non-academic team members? 	<ul style="list-style-type: none"> • Under what conditions does academic ownership limit ASOs' ability to pursue strategic choices like diversification, IPOs, or divestment? • How does academic ownership influence ASOs' choice of investors, such as venture capital, business angels, or corporate venture capital? 	<ul style="list-style-type: none"> • What economic considerations are academic entrepreneurs willing to compromise to maintain control over the ASO? • How does academic ownership impact the internationalization prospects of ASOs, either hindering or facilitating their global expansion?
Identity	<ul style="list-style-type: none"> • How does the reputation, background, and alignment of non-academic managers with the academic team impact the establishment of trust and delegation of responsibilities within ASOs? 	<ul style="list-style-type: none"> • To what extent does the identification of the ASO with its parent institution influence organizational growth strategies? • How does the consistency of identity between academic entrepreneurs and their ASOs shape the organizations' strategies related to intellectual property? 	<ul style="list-style-type: none"> • In what ways does the alignment of identity between academic entrepreneurs and their ASOs influence decisions regarding internationalization or the continuation of business operations despite poor financial performance? • How do considerations of organizational identity impact the international partnerships and foreign market entry choices of ASOs?
Emotions	<ul style="list-style-type: none"> • How does the presence of emotions impact the effectiveness of the ASO's team and board, influencing the inclusion or exit of members? • In what ways is employee turnover affected by conflicts within ASO teams stemming from different pressures experienced by founders in various stages of their academic careers? 	<ul style="list-style-type: none"> • Under what circumstances do ASOs make organic vs. inorganic growth decisions to enhance the social fulfillment of their academic founders within the academic community? • How does the pursuit of scientific passion within ASOs influence their concerns for societal impact, potentially leading the ASO to apply for philanthropic venture capital? 	<ul style="list-style-type: none"> • In situations where the ASO fails to fulfill the founding team's prestige attainment, how do emotions influence early exit decisions? • Under which circumstances does the pursuit of emotions in the organizational setting limit the international scope of ASOs?

informal control and influence strategic decision making (e.g., Visintin & Pittino, 2014; Sciarrelli et al., 2021; Ben-Hafäiedh et al., 2022). The reluctance to involve professional managers without an academic background (Ensley & Hmieleski, 2005; Nikiforou et al., 2018), we argue, is driven by the desire to minimize the potential loss of control, even at the expense of potential economic performance gains. Similarly, when it comes to recruiting new members (e.g., through the addition of new board members; Bjørnåli & Gulbrandsen, 2010), the need to preserve non-economic endowments connected to identity may lead ASOs to prefer members whose values align with academic logics over performance considerations. This thinking reflects and extends upon the mimetic isomorphism proposed by Ensley and Hmieleski (2005). As proposed by these authors, ASOs tend to hire members from the university community, mimicking the hiring patterns promoted by their parent institution.

Although the reluctance to diversify the team might be perceived as a weakness, it is crucial to recognize that alignment in members' backgrounds could yield positive performance implications. The homogeneity in cultural imprinting and mindsets can enhance communication, cohesiveness, and decision-making. Heterogeneity, on the other hand, may lead to conflicts that harm firm performance, especially in the context of ASOs (Hambrick et al., 1998; Earley & Mosakowski, 2000; Nielsen & Nielsen, 2013). In the specific case of ASOs, recent contributions use the faultlines perspective to warn against heterogeneity in the founding team professional background and ownership structure (Sciarelli et al., 2021; Ben-Hafaïedh et al., 2022). Such research cites evidence that communication between academic and non-academic members within a team can be impaired by excessive cognitive distance (Knockaert et al., 2011).

Including a discussion of non-economic goals in the study of ASOs' team development can provide avenues for addressing some of the paradoxes present in academic entrepreneurship. Future research could, for instance, explore circumstances in which academic founders are more or less willing to relinquish control. Such studies could also investigate how founders' identification with the business affects team development and, consequently, firm performance, as summarized in Table 2. This perspective would add nuance to our understanding of ASOs and their decision-making processes.

4.2 ASOs' growth

Despite their remarkable innovation potential, many ASOs do not pursue growth-oriented patterns, prompting scholars to explore potential explanations for this phenomenon (Brown & Mason, 2014; Czarnitzki et al., 2014; Hesse & Sternberg, 2016). Some argue that ASOs may face challenges in pursuing growth due to factors like a lack of entrepreneurial drive and vision, low levels of risk-taking propensity, and scarce proactiveness (e.g., Styles & Genua, 2008). However, we propose an additional explanation to this finding: ASOs' decision-makers often deliberately choose not to pursue growth (Hayter, 2011; Hesse & Sternberg, 2016) to avoid the potential threats that high-growth strategies can pose to their non-economic endowments.

Financing high-growth strategies often results in founders losing control over their businesses, typically due to the transfer of ownership to outside investors and the subsequent employment of external managers to design and execute these strategies (Wasserman, 2017). Additionally, accelerated growth can threaten the symbiosis between the academic context and venture, requiring a shift from informality to professionalization (Meyer, 2003; Hesse & Sternberg, 2016). These potential losses can be perceived as more threatening to the academic identity of scientist founders when weighed against the potential benefits of firm growth (Clarysse et al., 2023). In our framework, ASOs are not necessarily characterized as risk-averse; rather, they are seen as loss averse towards their perceived non-economic endowments (cf., Gomez-Mejia et al., 2011). Consequently, they may engage in risk-taking behavior when their non-economic endowments are at risk of being entirely lost, such as in the case of the ASO's closure. For example, during market downturns or severe performance declines, ASOs might display higher tolerance for risk compared to non-academic firms, especially if their parent institutions offer support to counterbalance environmental turbulence (Seguí-Mas et al., 2018). This risk tolerance could lead to diversification, unre-

lated acquisitions, or expansion into distant geographical markets, all aimed at avoiding the ultimate loss of non-economic endowments.

Considering the influence of non-economic goals in studying ASOs' growth patterns opens avenues for future research, as summarized in Table 2. Exploring the environmental contingencies under which ASOs are more or less risk-taking compared to non-ASO firms provides novel avenues for future research. Additionally, valuable insights could be gained by exploring when ASO founders' efforts to fulfill socio-relational needs through the organization become either an asset or a liability to the firm's growth strategies.

4.3 Performance events: survival, exit, and internationalization

4.3.1 Survival and exit

One of the recurring empirical findings in the academic entrepreneurship literature is that ASOs tend to financially underperform compared to similar firms, such as corporate spin-offs, start-ups, and new technology-based firms (Ensley & Hmieleski, 2005; Zahra et al., 2007; Wennberg et al., 2011; Roche et al., 2020). However, despite their financial underperformance, ASOs tend to survive longer than corporate spin-offs, start-ups, governmental spin-offs, and other science-based firms (Degroof & Roberts, 2004; Zhang, 2009; Criaco et al., 2014; Woolley, 2017). This apparent paradox raises the question of why ASOs are able to survive longer despite performing poorly.

Theoretical efforts to address the performance-survival puzzle in ASOs have been limited, with some researchers suggesting that "survival rates might not be ideal measures of spin-off performance" (Zerbinati et al., 2012, p. 22). We propose that incorporating non-economic goals-driven decision-making into this debate may help address the financial performance-survival puzzle in ASOs. Our perspective suggests that academic founders derive both economic and non-economic benefits from starting and running the ASO. Non-economic benefits derived from the pursuit of control, identity, and emotions may induce ASOs' decision makers to trade non-economic utility for financial wealth, thus prioritizing the continuity of their firms despite poor financial performance.² Recent empirical evidence supports this idea, indicating that academic founders, due to their academic identity and intrinsic motivations, exhibit lower growth aspirations compared to entrepreneurs of other innovative start-ups (Clarysse et al., 2023), tending to prioritize survival (Civera et al., 2024).

In ASOs, conflictive relationships that might lead to closure in other young high-technology firms may be managed and preserved in the hope that harmony will prevail in the end (Ensley & Hmieleski, 2005; Vanaelst et al., 2006). This willingness to manage conflicts could be attributed to how ASOs facilitate self-continuity, connecting memories of past experiences, present efforts, and future expectations (Kleine et al., 1995). Closing the business would represent the ultimate loss of the non-economic benefits derived from owning and running an ASO.

These arguments open several avenues for new research, as outlined in Table 2. For instance, future studies could investigate whether the consistency of academic entrepre-

² The high value that academic founders place on non-economic utilities may lower their minimum 'threshold of acceptable performance' to stay on the market, explaining high(er) survival despite low(er) financial performance (Gimeno et al., 1997; Criaco et al., 2014).

neurs' identity with the ASO influences the decision to keep the ASO alive despite poor financial performance. Similarly, it would be interesting to explore how viewing the ASO as a setting to fulfill non-economic goals affects ASOs' exit decisions, such as acquisitions (see also Mathisen et al., 2022). Academic founders may be less likely to sell if they perceive the prospective buyer to be a 'bad steward' for the ASO; alternatively, they may be more willing to exit once the company no longer provides the opportunity to pursue scientific curiosity or solutions to societal challenges.

4.3.2 Internationalization

The markets in which ASOs operate are often characterized by uncertainty and complexity due to the novel nature of the products and services they commercialize and the need to challenge existing business models and technological standards (Perez & Sánchez, 2003; Shane, 2004; Walter et al., 2006; Patzelt & Shepherd, 2009; Knockaert et al., 2011). Successfully navigating such environments usually requires an entrepreneurially oriented strategic posture, including the ability to frame commercial opportunities for new technologies, take risks in product-market strategies, and anticipate demand and competition (Walter et al., 2006; Rasmussen et al., 2011; Diáñez-González & Camelo-Ordaz, 2016). However, ASOs often seem to lack risk-taking propensity and proactiveness in their strategic choices, leading to challenges in pursuing private funding (Patzelt & Shepherd, 2009; Munari & Toschi, 2011), internationalization (Walter et al., 2024), and acquisitions (Bonardo et al., 2010).

To address this paradox, it is crucial to consider the non-economic goals pursued by ASOs. Researchers have identified customer focus and adaptation to different customer demands as key drivers of ASOs' internationalization (Andersson & Berggren, 2016). However, pursuing certain types of non-economic goals, particularly those related to emotional content like the continuity and memories of ASOs' original research scope, might introduce rigidities that hamper internationalization. Conversely, other types of non-economic goals may favor firm internationalization. When decision-makers in ASOs view their firm as an extension of the research group and are concerned with their international reputation and prestige, they may be more likely to seek international expansion. This reputational element can help explain the positive relationship between a university's internationalization and the ASO's degree of internationalization. Decision-makers from these universities are more likely to be concerned with international prestige and derive non-economic utility from the internationalization of ASOs (Walter et al., 2024).

5 Discussion

In the ongoing effort to advance our understanding of academic entrepreneurship, the current body of literature falls short in explaining the theoretical foundations of certain paradoxes observed in empirical studies. Drawing from the literature on organizational goals, our paper introduces a novel theoretical framework aimed at illuminating the role of non-economic goals in shaping the outcomes of ASOs.

5.1 Contributions to research

This study contributes to the academic entrepreneurship literature in two ways. Firstly, our framework explains how non-pecuniary motivations, that are pivotal in the formation of ASOs, continue to influence these firms' outcomes post-establishment. Prior research in academic entrepreneurship has focused on the decision to initiate science commercialization activities, such as starting a spin-off (e.g., Jain et al., 2009; Pilegaard et al., 2010; Sauermann & Stephan, 2013; Huyghe et al., 2016; Meek & Wood, 2016). This focus has overlooked the enduring influence of non-pecuniary motivations on these firms' outcomes. A notable exception is the study by Civera et al. (2024), which explores how performance is affected by the different motivations of ASOs, ranging from extrinsic monetary and reputational to intrinsic; the authors assess these motivations by examining the structural components of the founding team and the academic and regional environments of these firms. Similarly, our theoretical framework posits that the outcomes sought by ASOs' decision-makers are rooted not only in economic considerations but also in non-economic ones based on the non-economic benefits that academic founders derive from owning and running the ASO. Thus, their roles as founders and owners of science commercialization activities empower academic entrepreneurs to make decisions that benefit both their roles as researchers and the ASO. As demonstrated, this duality opens avenues for numerous future research questions, enriching our understanding of the potential benefits of ASOs as hybrid organizations (Abootorabi et al., 2023). In this sense, our work contributes to a more nuanced understanding of the post-entry distinctions between ASOs and other young high-technology firms (Wennberg et al., 2011; Agarwal & Shah, 2014; Fryges & Wright, 2014). Researchers can better understand the distinct nature of these organizations by studying the significance of non-economic factors, such as the benefits of control, identity consistency, and emotional attachment in ASOs' post-entry decision-making and behavior.

Secondly, our study extends the literature on ASO development and related paradoxes (Mathisen & Rasmussen, 2019) by introducing the role of non-economic goals and their impact on firm outcomes. Previous research in this domain often attributed ASOs' inability to achieve certain outcomes, such as accessing private funding, achieving high growth, and undergoing IPOs, to a lack of resources and capabilities (Patzelt & Shepherd, 2009). Our paper challenges this perspective by suggesting that ASOs' pursuit of non-economic goals, specifically in terms of control, identity, and emotions, sheds lights on some of the puzzles and inconsistencies present in the existing literature. We also illustrate how future research can incorporate non-economic goals into the study of ASOs' outcomes and provide a more realistic view of the circumstances in which embeddedness in an academic setting acts as an asset rather than a liability for ASOs. For example, in their recent study, Abootorabi et al. (2023) show that ASOs' non-economic goals are an important predictor of firm development and performance.

5.2 Implications for policy

The integration of non-economic factors as distinctive features influencing ASOs' outcomes holds significant implications for policy development, potentially shaping a more informed approach to supporting academic entrepreneurship. Prevailing policy interventions have often operated under the simplified assumption that actors primarily respond to economic

incentives based on ‘pure’ economic rationality (e.g., Sandström et al., 2018). In contrast, effective policy formulation should recognize the diverse range of goals and benefits, including non-economic aspects, pursued by ASO founders in their entrepreneurial endeavors.

A thorough consideration of the actual goal system of ASOs could lead to more targeted policy measures, particularly in terms of services offered by entrepreneurial support and advisory organizations, such as incubators, accelerators, and science parks (Meoli & Vismara, 2016). These support measures should better accommodate the heterogeneity of academic entrepreneurs’ motivations so that assistance and support can be tailored to align with post-founding ASOs’ goals (e.g., Abootorabi et al., 2021). Advisors could leverage ASOs’ non-economic goals, such as identity consistency and emotional attachment, as channels for long-term and patient investment in research and development, ultimately fostering growth (Smith et al., 2018; Civera et al., 2019).

Moreover, acknowledging the role of non-economic goals in ASOs’ behavior can enhance our understanding of the consequences of regulatory changes related to scientists’ intellectual property rights (e.g., Geuna & Rossi, 2011; Grimaldi et al., 2011; Aldridge & Audretsch, 2017). This aspect is particularly relevant in assessing how academic entrepreneurs evaluate the returns on their engagement with industry through ASO founding (e.g., Åstebro et al., 2013; Åstebro et al., 2019), especially in light of recent legislative changes like the abolition of the “professor privilege” in some countries.³

Finally, adopting a behavioral perspective alongside the resource- and capability-based approach could enrich early-stage equity investors’ evaluation and appraisal schemes for ASOs (Minola et al., 2017). Assessing non-economic goals, such as prestige, identity congruence, and control, provides valuable insights into the virtuous behaviors of ASOs in terms of decision-making and, consequently, their success and growth potential.

5.3 Limitations and future research directions

Despite its contributions, our study, like any conceptual effort, is subject to certain boundary conditions and assumptions. Relaxing these assumptions can inform future research. First, it might be valuable to challenge the assumption that the interaction between academia and business is a straightforward antecedent of non-economic utility accumulation in ASOs. As implicitly anticipated in the research agenda section, the level and significance given to non-economic goals might differ depending on the ASO’s scientific field, industry, product/service, university context, and other features. Factors like the size of the firm or research team, as well as the involvement of key non-academic stakeholders, may influence the emergence of non-economic goals and the degree to which academic founders perceive it as legitimate to use the ASO as a vehicle to protect their non-economic endowments. Future efforts might extend our conceptual model to incorporate these dimensions.

Second, while this paper focuses on internal non-economic goals, future research could extend our framework to include external goals (Kotlar et al., 2018). Because ASOs neither emerge from nor develop in a vacuum, various influences such as the university entrepreneurial climate and regional or national culture are worth considering as external sources of ASOs’ organizational goals. The pressures exerted by these actors may contribute to making non-economic goals more or less pronounced (Civera et al., 2024) and create conditions for academic entrepreneurs to pursue such goals to a higher or lower extent. Our perspec-

³ <https://www.lexology.com/library/detail.aspx?g=5e6e93a5-b997-4bef-ab0d-b7aeebcfdce0>.

tive thus opens the possibility for an in-depth investigation of how ASOs' goal formation and pursuit may be impacted by contextual aspects, such as the features of the socio-economic environment, the munificence of the entrepreneurial ecosystem, or the prestige of the originating academic institution (e.g., Fini et al., 2011; Rizzo, 2015; Franco-Leal et al., 2019). For instance, ASOs might be compelled by their parent university to contribute to its prestige and ranking (Pitsakis et al., 2015). In socio-economic environments characterized by material constraints, the ASO might focus on securing financial stability for its internal coalition. If the academic environment is unfavorable or if there is a lack of demand for specialized skills, founders might see ASOs as an opportunity to carve out a niche for themselves, prioritizing decisions that offer quick returns, such as market-driven research and development, alignment with industry needs, and external partnerships for rapid commercialization. The strength and nature of the entrepreneurial ecosystem can also define the scale and scope of ASOs, with a supportive ecosystem encouraging decision-makers to set more ambitious goals, such as rapid growth or international expansion. Our framework provides the conceptual lens for future research aiming to understand how these contingent aspects are incorporated into ASO founders' cognitive processes in the founding and post-founding stages.

Finally, while our framework focuses on the role played by non-economic goals, future research could explore the tensions between economic and non-economic considerations in ASOs. Scholars could explore the heterogeneity among ASOs in terms of their goals and investigate the antecedents that explain variations in emphasis. Moreover, future research could examine how ASOs manage the tensions between economic and non-economic goals and the implications of such tensions on ASOs' outcomes. These studies could advance our understanding of ASOs as hybrid organizations (Abootorabi et al., 2023). Another valuable avenue for future research involves examining how tensions between the academic and business spheres dynamically affect the pursuit of economic and non-economic goals throughout the life of ASOs, extending beyond their initial phases (e.g., Cantner et al., 2023; Schou, 2023).

6 Conclusion

Despite the acknowledged existence of non-economic motives behind academics' decisions to commercialize their discoveries through ASOs, there is limited understanding of how such motives influence these organizations post-founding. Drawing on organizational goals and academic entrepreneurship research, this paper conceptualizes the distinctive nature of non-economic goals in ASOs and explains how they inherently characterize ASOs by illustrating their roots in the academic setting from which ASOs originate. It then proposes a theoretical model linking non-economic goals to ASOs' outcomes, arguing that this model can generate new research contributions and policy implications for academic entrepreneurship.

Funding Open access funding provided by Università degli studi di Bergamo within the CRUI-CARE Agreement.

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