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Spawned by opportunity or out of necessity? Organizational antecedents and the choice of industry and technology in employee spinouts

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Abstract

Research summary: I examine how the organizational antecedents of spinouts shape the new firms' industry and technological trajectory choices compared to those of the parent firms. Building on prior research on employee entrepreneurship and integrating insights from the literature on opportunity and necessity entrepreneurship, I hypothesize that spinouts launched to exploit a new business opportunity shunned by the parent firm (i.e., opportunity spinouts) are more likely to enter a different but related industry and technological field to those of the parent firm. I hypothesize also that spinouts triggered by adverse developments in the parent firm (i.e., necessity spinouts) are more likely to target the same industry and technological field as the parent. Analysis of data from the European biotech industry supports these predictions.

Managerial summary: The prevailing view of employee entrepreneurship is that the established firm's unwillingness to commercialize an employee's ideas leads to the employee leaving to start a new firm. However, evidence suggests that spinout activity (new firm formation by former employees) can be also triggered by adverse developments in the established firm that disrupt an employee's job. This study examines how the organizational antecedents of spinouts shape the new firms' early-stage strategic choices.

Using data from the biotech industry, I show that opportunity driven spinouts are more likely to enter a different but related industry and technological field to those of their founders' prior employer and that necessity driven spinouts are more likely to target the same industry and technological field as the prior employer.

KEYWORDS
employee spinouts, necessity entrepreneurship, new ventures strategy, opportunity entrepreneurship, organizational antecedents

1 | INTRODUCTION

Research on employee entrepreneurship—new firm formation by a former employee of an established firm—has received significant scholarly attention over the last two decades (Agarwal et al., 2004; Campbell et al., 2012; Ganco, 2013; Kaul et al., 2024).[1] The prevailing view of spinout formation is that when an established firm undervalues or deliberately chooses not to commercialize knowledge created internally, entrepreneurial opportunities become available to employees who may decide to exploit them through venturing out (Agarwal et al., 2007; Cassiman & Ueda, 2006; Gambardella et al., 2015; Hellmann, 2007). In this view, knowledge-rich firms are considered "entrepreneurial hotbeds" (Burton et al., 2002; Franco & Filson, 2006), and it has been shown that those with underutilized technological or market knowledge have higher spinout rates (Agarwal et al., 2004). An example here is the founding of the diagnostic company Amic AB. While employed by Biacore and later Pharmacia Biotech, Ove Öhman discovered the application of microfluidics in the biotech field. Since Ove's employers declined the opportunity to pursue the use of this technology, in 1998, Ove Öhman co-founded Amic to develop rapid in vitro diagnostic tests for use in point-of-care or near-patient settings. The company manufactured the 4castchip, a microstructured polymer slide which is used for immunoassay tests. In 2008, Johnson & Johnson acquired Amic to obtain access to the company's technology platform for its Ortho-Clinical Diagnostics division.[2]

However, not all spinouts are launched to exploit new business opportunities shunned by an established firm. Evidence from multiple industries suggests that some spinouts are triggered by developments in the established firm that disrupt employees' jobs, making continued employment less attractive or even impossible for them (Bruneel et al., 2013; Buenstorf, 2009; Kim, 2022). For example, within 12 months of Pfizer closing down its R&D facilities in Ann Arbor in 2008, 15 biotechnology startups were created by employees who had been laid off as a result.[3] Similarly, when as part of a reorganization of its R&D structure AstraZeneca closed its research facilities near Lund and Södertälje in Stockholm County, 69 startups were created by former employees who had lost their jobs (Life Science Sweden, 2013). Evidence from the US and German laser industries, likewise, indicates that adverse developments (e.g., mergers or acquisitions, strategic refocusing, involuntary exit) in established firms led some employees to start their own new firms (Buenstorf, 2009; Dahl & Reichstein, 2007; Klepper & Sleeper, 2005).

The point of departure for this article is the heterogeneity in the organizational antecedents of spinouts. Prior research suggests that pre-founding conditions affect the new firm's post-founding strategies, structure, and long-run performance (Beckman, 2006; Boeker, 1988; Johnson, 2007; Marquis & Tilcsik, 2013). For example, research indicates that the entrepreneur's prior experience in the focal industry significantly constrains the initial strategy such as choice of product market, geographic market, and physical resources and that new firms often "replicate the strategies of legacy firms" (Fern et al., 2012, p. 427; Gruber et al., 2013; Phillips, 2002). Other studies argue that spinouts may break the "parental mold" to establish a unique competitive identity (Ferriani et al., 2012) or enter a

different product market to guard against competition with the spinout founder's former employer (i.e., parent firm) (Bahoo-Torodi & Torrisi, 2022; Klepper & Sleeper, 2005; Walter et al., 2014). In this article, I examine how the organizational antecedents of spinouts shape the new firm's industry and technological trajectory choices compared to those of the parent firm. This is an important question since the literature tends to focus on specific industry settings and examines the formation of spinouts in the same industry as the parent firm (Agarwal et al., 2004; Campbell et al., 2012; Ganco, 2013; Klepper & Sleeper, 2005). As a result, little is known about the experience of spinouts that cross industry boundaries and enter a different sector from that of the parent firm (Adams et al., 2016; Adams et al., 2024; Agarwal et al., 2020; Sakakibara & Balasubramanian, 2020).

I draw on the literature on the genesis of spinouts, which suggests that established firms may shun potentially valuable opportunities that lack complementarities with their core activities (Cassiman & Ueda, 2006; Gambardella et al., 2015; Ganco, 2013; Gompers et al., 2005; Hellmann, 2007). In this case, the resulting spinout should enter a different field from that targeted by the parent firm (Agarwal et al., 2004; Klepper & Sleeper, 2005). However, given that the knowledge acquired by employees through prior employment experience is often unique to the parent's setting and is less valuable when transferred to a distant field (Fern et al., 2012; Neal, 1995; Sakakibara & Balasubramanian, 2020), I hypothesize that spinouts launched to exploit new business opportunities shunned by the employer (i.e., *opportunity spinouts*) are more likely to enter a different but related industry and technological field to those of the parent firm. I draw also on work on opportunity and necessity entrepreneurship which suggests that while opportunity entrepreneurs tend to develop new technologies or serve new market niches (McMullen et al., 2008; Reynolds et al., 2000), necessity entrepreneurs are more likely to leverage their human and social capital endowments and apply them within the same field in which they were obtained (Dencker et al., 2021; Nikiforou et al., 2019). I posit that spinouts triggered by adverse developments in the established firm (i.e., *necessity spinouts*) are more likely to target the same industry and follow the same technological trajectory as the parent firm for two reasons. First, unlike opportunity entrepreneurs who can monitor the attractiveness of other industries and emerging technological fields (i.e., the opportunity landscape) prior to leaving the parent firm, employees turned entrepreneurs out of necessity are more likely to identify and exploit opportunities within their current setting due to the *urgency* to respond to unfavorable developments in the employer firm (Alvarez & Barney, 2007; Dencker et al., 2021; McMullen et al., 2008; Nikiforou et al., 2019). Second, while established firms may exhibit hostility toward a new firm launched by a former employee that targets an overlapping product or technology market (Bae & Lee, 2021; Bahoo-Torodi & Torrisi, 2022; Walter et al., 2014), founders of necessity spinouts are not concerned about potential competition with the parent. This is because necessity spinouts originate from firms facing exit or as the result of the restructuring or strategic refocusing of the established firms. I test my predictions using European biotech industry data for 1990 to 2014. I also conducted interviews with the founders of 14 biotech spinouts and use these exploratory interviews to substantiate my theoretical claims (Appendix A provides details of the interviews).

My study contributes to two literature streams. First, it extends the employee entrepreneurship literature by linking the drivers of employee entrepreneurship to the industry and technological trajectory choices made by spinouts compared to those of the parent firms (Sakakibara & Balasubramanian, 2020). By distinguishing two sets of motivations underlying the formation of spinouts, this article juxtaposes strategic trajectories resulting from one or the other. In this regard, this result suggests not only that the motivations driving employee entrepreneurship are diverse but also that the underlying motivation ultimately shapes the strategic trajectory of spinout firms. Second, it contributes to work on necessity entrepreneurship. Much of the received literature portrays necessity entrepreneurs as individuals pushed into entrepreneurship by negative forces such as unemployment (Dencker et al., 2021; McMullen et al., 2008). The present study extends our understanding of the *why* behind necessity entrepreneurship (O'Donnell et al., 2024). In particular, it suggests that necessity entrepreneurs may differ in their motivation to pursue self-employment: while for some self-employment may be chosen to escape economic hardship resulting from unemployment (Acs, 2006; Block et al., 2015; Poschke, 2013; Shapero, 1975), for others and especially skilled individuals, the motivation might be escaping deteriorating employment conditions in the employer firm.

2 | BACKGROUND: GENESIS OF SPINOUT THEORIES

Organizations are often regarded as "fonts of entrepreneurship" since they provide employees with both entrepreneurial opportunities and the knowledge and skills required to make the transition to self-employment (Sørensen & Fassiotto, 2011). Evidence derived from various high-technology contexts such as the semiconductor (Adams et al., 2016), disk drive (Franco & Filson, 2006), laser (Klepper & Sleeper, 2005), medical devices (Chatterji, 2009), automobile (Klepper, 2007), and biotech (Stuart & Sorenson, 2003) sectors suggests that entrepreneurship is often nurtured by employment in an established firm. It has been shown also that spinouts outperform other startup types (Agarwal et al., 2004; Chatterji, 2009; Dahlstrand, 1997; De Figueiredo et al., 2013) due to the stock of resources embedded in their founders. These resources include technological and market knowledge (e.g., Franco et al., 2009), knowledge about regulatory strategy (e.g., Chatterji, 2009), and organizational routines and practices (e.g., Feldman et al., 2019) developed by the parent firm. The prevalence of spinouts and their superior performance compared to other entrants to the sector has inspired a large body of research on the drivers of employee entrepreneurship. The literature proposes three main explanations for spinout activity: (1) undervaluation or underutilization of employee ideas by an established firm, (2) adverse developments that disrupt the employee's job, and (3) nonpecuniary motives. In this section, I briefly discuss these arguments which form the basis for my theoretical propositions.

The first class of explanations suggests that the established firm's refusal to pursue a valuable but perhaps remote opportunity discovered by an employee may be due to constraints such as lack of commercialization capabilities or because exploitation of the opportunity is likely to be problematic for the firm's existing competencies and rents. For example, Cassiman and Ueda (2006) propose that established firms trade off the returns from exploiting a new opportunity against both cannibalization and the possibility of a more valuable opportunity in the future. Cassiman and Ueda suggest that firms may shun a seeming good opportunity which has a poor fit with their commercialization capabilities to exploit the potential benefits from pursuing opportunities that make use of their internal resources. Hellmann (2007) developed a multitask model in which the incentives to innovate (and the benefits thus derived) may interfere with the employee's incentives (and benefits) related to the performance of core tasks. Hellman's model suggests that discouraging employee inventions and subsequent spinout activity might be the outcome of a firm policy directed to increasing the focus on core tasks. Others have suggested that the existence of information asymmetry negatively affects the writing of efficient contracts between employee and employer and may persuade employees to exploit their ideas by setting up their own firms (Anton & Yao, 1995; Bankman & Gilson, 1999). For example, Chatterjee and Rossi-Hansberg (2012) argue that the employee has private information regarding the quality of his or her idea but that adverse selection prevents disclosure of the idea to the employer, or alternatively that employees reveal moderately valuable ideas to their employers and exploit the highest value ones in the market. Closely related are studies examining "spillover theories," which suggest that during employment with an established firm, employees learn about new business opportunities that have been ignored by the employer firm (Agarwal et al., 2004; Franco & Filson, 2006; Gambardella et al., 2015; Ganco, 2013). In line with this thinking, Agarwal et al. (2004) explore the relationship between the firm's knowledge capabilities and the likelihood of new firm spawning. Distinguishing between technological and pioneering market know-how, the authors argue that failure by the firm to invest simultaneously in both knowledge dimensions is likely to frustrate employees who may decide to exploit overlooked knowledge by venturing out. In a series of theoretical and empirical studies, Klepper proposes a theory of spinout formation driven by "strategic disagreement" and argues that as a result of contrasting incentives, spinout activity is driven by different views among employees and employers about the firm's optimal strategic direction (Klepper, 2007; Klepper & Sleeper, 2005; Klepper & Thompson, 2010). Overall, the first class of explanations suggests that undervaluation or underutilization of new opportunities by an established firm is a critical driver of employee entrepreneurship.

The second class of theories focuses on developments in established firms which have a negative effect on the employee's existing job (Buenstorf, 2009). The most obvious example is the established firm's involuntary exit (Dahl & Reichstein, 2007). For instance, in a sample of Danish firms, Eriksson and Kuhn (2006) show that many

spinouts originate in slow growth or termination of operations by the established firm. Evidence from the US and German laser industries similarly suggests a higher incidence of spinouts resulting from established firm exits (Buenstorf, 2007; Klepper & Sleeper, 2005). Other examples of developments that have negative effects on employees include changes to top management, a major shift in the firm's strategy, or the merger or acquisition of the established firm (Bruneel et al., 2013; Buenstorf, 2009; Rocha et al., 2018). Some of the empirical regularities and stylized facts related to spinout formation are consistent with these explanations; there is evidence that spinout rates increase around the time of an acquisition (Kim, 2022; Stuart & Sorenson, 2003) or with a change to the chief executive officer (CEO) (Klepper & Thompson, 2010).[4]

Finally, there can be nonpecuniary motives for engagement in employee entrepreneurship. For example, Astebro et al. (2011) argue that entrepreneurs tend to be "stars" or "misfits" and occur in the tails of the ability distribution. In their model, misfits are individuals whose entrepreneurial activity is motivated by a preference for autonomy or self-employment (Elfenbein et al., 2010). There is evidence also that the desire for work independence and freedom from managerial frictions (e.g., interpersonal conflicts with supervisors or coworkers) can spur the formation of spinouts (Carnahan et al., 2012; Franco & Filson, 2006). However, the theories related to nonpecuniary motivations are less clearcut and often include other motivations or evolve over time (Shah et al., 2019). For example, the management's decision not to pursue an employee's invention may induce interpersonal conflict which works to reinforce the employee's decision to form a spinout.

3 | HYPOTHESIS DEVELOPMENT

To develop my hypotheses about the link between the organizational antecedents of spinouts and the resulting firm's strategic choices about industry and technological trajectory at the time of establishment, I draw on and combine two literature streams. Specifically, I draw on work on employee entrepreneurship and research on the genesis of spinouts summarized in the previous section in particular, combined with the findings in the opportunity and necessity entrepreneurship literature.

The distinction between opportunity entrepreneurs who are "pulled into entrepreneurship by its attractiveness" and necessity entrepreneurs who are "pushed into entrepreneurship by negative factors" has been widely acknowledged (Amit & Muller, 1995; Dencker et al., 2021, p. 60; Shapero, 1975, 1982). Opportunity entrepreneurship refers to "an active choice to start a new enterprise based on the perception that an unexploited or underexploited business opportunity exists" (Acs, 2006, p. 97) whereas necessity entrepreneurship refers to "the creation of new firms by individuals facing adverse circumstances" (Gruber et al., 2024, p. 401).

Prior research suggests that opportunity and necessity entrepreneurs differ in their motivations to found a new firm (Block & Wagner, 2010; McMullen et al., 2008; Welter et al., 2017), their human capital endowment types (Block et al., 2015; Dencker et al., 2021; Gruber et al., 2024), and the expected long-run performance of the new firm (Bruneel et al., 2013; Dencker et al., 2009; Dencker & Gruber, 2015). For example, prior work indicates that we can envisage entrepreneurial motivation "as lying along a continuum" (Dencker et al., 2021, p. 63) which extends from necessity entrepreneurs driven into self-employment out of basic need (i.e., the lowest two levels in Maslow's, 1954 needs hierarchy) to opportunity entrepreneurs who start a venture to fulfill higher-level psychological and self-fulfillment needs. Others emphasize the role of human capital in entrepreneurship and suggest that while opportunity entrepreneurs tend to be *generalists* equipped with a broad skillset, necessity entrepreneurs are more likely to be *specialists* who capitalize on a particular knowledge domain to launch a new firm (Gruber et al., 2024). Overall, prior research suggests that opportunity entrepreneur startups are superior in terms of resources endowments, attractiveness of the opportunities exploited, and long-run performance (Burtch et al., 2018; Dencker et al., 2009; O'Donnell et al., 2024).

In this section, I start by examining the choice of industry and technological trajectory among spinouts launched to exploit new opportunities shunned by the parent firm which in line with Buenstorf (2009) I describe as

opportunity spinouts. As already mentioned, the literature on spinout origins suggests that they are due to the established firm failing to appreciate the value of an opportunity or deliberately refusing to commercialize an opportunity that lacks complementarities with its own core activities. Therefore, prior research predicts that spinouts launched to pursue such opportunities will enter a new industry sector or a different technological field from that of the parent firm (Cassiman & Ueda, 2006; Gambardella et al., 2015; Hellmann, 2007). However, given that the value and relevance of the knowledge and resources accumulated by employees during employment in the parent firm decreases with the distance from the parent firm's setting (Fern et al., 2012; Neal, 1995; Sakakibara & Balasubramanian, 2020), I argue that employees are more likely to pursue an ignored business opportunity in a field that is different from but related to the parent's core business. I then examine the strategic choices made by spinouts launched in response to adverse developments that decrease the attractiveness or possibility of further employment in the established firm and following Buenstorf (2009) I describe these as necessity spinouts. Necessity entrepreneurs have "ready-to-use" skills and deep knowledge of their particular setting (Gruber et al., 2024; Nikiforou et al., 2019) which enable them to identify and exploit existing opportunities including projects that have been abandoned due to adverse developments in the firm. Moreover, employees turned entrepreneurs out of necessity are not at risk of hostile actions from the parent firm; therefore, they are free to establish businesses in overlapping fields. Building on these two arguments, I hypothesize that necessity spinouts are more likely to target the same industry and follow the same technological trajectory as the parent firms.

3.1 | Opportunity driven spinouts and industry and technological trajectory choices

There is a substantial stream of work on "third-person opportunities" or factors in the environment that attract the attention of would-be entrepreneurs and subsequently trigger "first-person action" in the form of new firm founding (McMullen & Shepherd, 2006; Shepherd et al., 2007). The literature suggests that recognition and exploitation of entrepreneurial opportunities are linked to the individual's prior knowledge stock (Shane, 2000). Employment experience in a particular industry is an important source of the entrepreneur's knowledge and skills. For example, employment in an established firm provides access to technological know-how which can enable establishment of a new firm (Ganco, 2013; Teece, 1986). Indeed, it has been shown that firms operating at the technology frontier produce more entrepreneurs (Franco & Filson, 2006; Garvin, 1983) and that those with underutilized technological opportunities spawn more entrepreneurial firms (Agarwal et al., 2004; Burton et al., 2002; Klepper & Thompson, 2010). Likewise, employees involved in manufacturing and production processes gain knowledge about the shortcomings of existing products (Shah & Tripsas, 2007), unmet customer needs (Helfat & Raubitschek, 2000; Shepherd & DeTienne, 2005), and underutilized market opportunities which they can exploit by venturing out (Agarwal et al., 2004). By taking advantage of often untapped knowledge to start a new firm, employee entrepreneurship channels knowledge spillovers from established to new firms (Agarwal et al., 2007, 2010; Audretsch & Keilbach, 2007; Garvin, 1983; Klepper & Thompson, 2010).

As discussed in the previous section, the stream of work on the genesis of spinouts emphasizes that established firms may shelve innovative ideas due to limited capacity to respond to radical technological changes (Christensen, 1993; Henderson, 1993), failure to recognize the value of a novel idea (Gompers et al., 2005; Klepper & Thompson, 2010), or a low fit between an opportunity and the firm's internal resources (Cassiman & Ueda, 2006; Gambardella et al., 2015; Hellmann, 2007). This can cause frustration among employees whose ideas are rejected (Klepper & Sleeper, 2005) and result in their leaving the firm to exploit an idea that might involve "new niche markets or technologies their parents are unwilling or slow to pursue" (Klepper & Sleeper, 2005, p. 1293). An interview with a spinout founder supports the idea that established firms often choose not to commercialize ideas from within the firm that have little overlap with their existing businesses:

> *Technology was not a problem. But the market, and the focus in the sense that they were mainly involved in research activities for other firms. They were working on biopharmaceutical, and my idea was related to the diagnostic field. So, for them, this was an entirely new sector, which required very specialized resources from production to marketing strategy … You cannot use existing resources for a new initiative. [For example] if you hold knowledge of regulatory issues in biopharmaceutical, this expertise cannot be used in the field of diagnostics. Of course, it's not like starting from zero but it's not like knowing everything. (Interview 13)*

Employees not only learn about entrepreneurial opportunities through prior employment experience in the industry, but they also develop valuable skills and gain access to the resources and relevant networks required to launch a new firm. Previous research highlights the importance of an established firm as an "arena for learning" allowing employees to inherit knowledge and resources ranging from technical to managerial skills which they can capitalize on to launch their own firms (Agarwal & Shah, 2014; Franco & Filson, 2006; Sørensen & Fassiotto, 2011). This inherited knowledge tends to be tacit (Nelson & Winter, 1982; Szulanski, 1996) and mostly unique to a specific setting (Neal, 1995; Shane & Stuart, 2002). That is, although knowledge accumulated in a specific setting may be applicable in related fields, that knowledge may be less valuable when transferred to distant fields (Carroll et al., 1996; Fern et al., 2012; Nikiforou et al., 2019; Sakakibara & Balasubramanian, 2020). For example, general organizational capabilities and managerial skills acquired from employment in the parent firm's industry will be applicable more broadly in various other industries (Chatterji, 2009; Phillips, 2002) while intangible resources such as relationships with buyers and suppliers and functional area resources such as R&D or marketing will be applicable to a limited range of fields (Helfat & Lieberman, 2002). Anton and Yao (1995) and Cassiman and Ueda (2006) argue that even the technological knowledge gained in one industry can be applied in nearby industries—a view endorsed by one of my interviewees:

> *We discovered ways of transforming the technology to other pieces and other markets… I would say our technology is pretty much similar. We only tried to apply it in a related field… but the previous company dismissed it because we were diversifying into the biomedical field using genetically engineered animals. (Interview 4)*

The depreciation in the relevance of parental knowledge (Fern et al., 2012; Nikiforou et al., 2019; Sakakibara & Balasubramanian, 2020) means that knowledge inherited by employees loses its value when transferred to fields distant from the parent's setting. Thus, employees turned opportunity entrepreneurs are more likely to pursue opportunities ignored by the parent firm that they can exploit by leveraging the knowledge and resources accumulated during their employment. Together, these arguments imply that opportunity spinouts are likely to be based on opportunities in nearby industries or emerging technological fields related to those of the parent firms.

> **Hypothesis 1.** Opportunity spinouts are more likely to be established in a different (but related) industry and a different (but related) technological field compared to the parent firm.

3.2 | Necessity driven spinouts and industry and technological trajectory choices

While opportunity spinouts are prompted by "the discovery of a promising new business opportunity," necessity spinouts are the result of "adverse developments that render future employment at the parent firm less attractive or even impossible" (Buenstorf, 2009, p. 23). The involuntary exit of an established firm through bankruptcy is an important driver of employee entrepreneurship out of necessity (Dahl & Reichstein, 2007; Eriksson & Kuhn, 2006; Ritsilä & Tervo, 2002). Another driver of entrepreneurial activity by former employees is the merger or acquisition of

the established firm (Stuart & Sorenson, 2003). Both mergers and acquisitions disrupt the target firms and their employees and may result in the loss of personnel autonomy, relocation of activities, abandonment of some activities or research projects, and involuntary staff turnover (Haspeslagh & Jemison, 1991; Kim, 2022; Puranam et al., 2006). Finally, a strategic refocusing, for instance, following a change to the firm's top management also serves to trigger employee entrepreneurship (Klepper & Thompson, 2010). A newly appointed CEO may not prioritize previously initiated projects due to incentive misalignment or uncertainty around the technology or market demand. This can encourage would-be entrepreneurs to found a company to pursue those projects externally (Kaul et al., 2024; Kim, 2022; Klepper & Thompson, 2010). This is exemplified in the following extract from a spinout founder interview:

> *We were doing something that was not interesting anymore for the parent company. At least for the management. [At] that time, the person in charge changed. [So] they implemented a different strategy, which didn't include cloning and genetic engineering of animals… They stopped the project because they believed it was no longer in line with their strategy. (Interview 10)*

Overall, adverse developments such as exits, restructuring, or strategic refocusing which are beyond the control of the individual employee can be disruptive to employees' jobs and result in the discontinuation of some research activities and innovation projects making continued employment in the established firm less attractive (or impossible) which has an effect on those employees' careers. In particular, while there may be other alternatives than self-employment, although "decent in objective terms," those alternatives may not be "desirable to, or suitable for, certain people or groups" (O'Donnell et al., 2024, p. 62). For example, laid off employees following a takeover or job disruption due to a change in management might consider taking up other employment that allows them to continue working on previous activities and research ideas. However, the unwillingness of other firms to take on projects developed but discontinued by a competitor (Garvin, 1983; Kaul et al., 2024) combined with the unwillingness of laid off employees to relocate (Kim, 2022) or continue working for an established firm (Nikiforou et al., 2019) render entrepreneurship the only decent and desirable employment alternative (O'Donnell et al., 2024).[5]

Research on opportunity and necessity entrepreneurship suggests that individual founders differ not only with respect to the type of needs they seek to fulfill but also the type of their human capital endowments which may influence the types of opportunities they identify and develop later in their own firms. For example, McMullen et al. (2008) argue that while opportunity-motivated entrepreneurs tend to be more innovative and growth-oriented, necessity-motivated entrepreneurial activities are *imitative* in the sense that they tend to replicate already existing business activities. Similarly, other studies show that unlike opportunity entrepreneurs whose generalist human capital endowments tend to make them jacks-of-all-trades (Lazear, 2005), necessity entrepreneurs tend to have rather specific human capital and launch new firms in the same sector in which they acquired their skills and experience (Brewer & Gibson, 2014; Gruber et al., 2024; Nikiforou et al., 2019). Dencker et al.'s (2021, p. 71) study accounts for the necessity entrepreneur's level of human capital, environmental setting, and institutional support for entrepreneurship and argues that highly skilled and well-educated individuals in developed environments who start a new firm out of necessity tend to engage in a "path dependency entrepreneurial process." This is because their deep knowledge of a particular setting narrows their opportunity search and increases the likelihood of identifying an opportunity that overlaps with their particular knowledge and experience (Dencker et al., 2021; Gruber et al., 2024).

In the context of employee entrepreneurship, I argue that for two reasons necessity spinouts are more likely to be in the same industry and technological field as the parent firm. First, employees turned entrepreneurs out of necessity are more likely to capitalize on their individual human and social capital endowments including technical know-how, relationships with customers and suppliers, and specific market knowledge. In particular, while opportunity entrepreneurs prior to leaving the parent firm are able to monitor the opportunity landscape and identify attractive opportunities in industries and technological fields other than those of their employer, necessity entrepreneurs tend to have little or no control over the timing of their transition to entrepreneurship due to the urgency to respond to an adverse development in the parent firm. This makes necessity entrepreneurs more likely to identify and pursue opportunities in the parent firm's sector. In an interview, a spinout founder said that:

> *When the company [was] bankrupted, the four of us decided to launch a new company carrying on some ideas, some work, and some technologies that we had developed during the previous work. Because we were interested in continuing, and we believed we could have more success. So, we established contact with previous customers that we had and asked if we could continue providing the same service. (Interview 2)*

Second, the literature on employee entrepreneurship suggests that spinouts may be threatened by retaliation and hostile actions from the parent firm in the form of price competition, intellectual property lawsuits, or dissemination of negative information, and especially if the business opportunity being pursued is in an overlapping market or technological field (Bae & Lee, 2021; Bahoo-Torodi & Torissi, 2022; Klepper & Sleeper, 2005; Walter et al., 2014). However, compared to opportunity spinouts, these risks are less severe for necessity spinouts since although exploitation by the spinout of an undervalued or underutilized opportunity might eventually threaten the parent firm's competitive position (e.g., by providing a substitute product using an underutilized technology), necessity spinouts are the result of market exit or major restructuring or refocusing of the parent's core strategy. Therefore, necessity spinouts can target an overlapping industry or technological field without fear of potential hostile actions.

> **Hypothesis 2.** Necessity spinouts are more likely to be established in the same industry and technological field as those of the parent firm.

4 | METHODOLOGY

4.1 | Data and sample

The data for this study are drawn from several sources. First, I searched the ThomsonOne (VentureXpert) database to identify the population of European venture capital (VC)-backed startups established in the biotech industry in the period 1990–2014, resulting in a list of 925 startups.[6] Second, I searched on LinkedIn and Crunchbase to collect information on the career histories of startup founders. I found information for the founding team members of 717 startups. Third, I used Bureau Van Dijk's Orbis database to collect information on startups' ownership history to distinguish stand-alone startups with no ownership ties to another firm at the time of establishment. In line with prior studies (e.g., Agarwal et al., 2004; Campbell et al., 2012; Klepper & Sleeper, 2005), I considered a VC-backed independent startup as a spinout if it was founded by one or more former employees of an established firm. This sampling procedure resulted in a total of 127 spinouts. The other startups were identified as: 57 corporate spinoffs (i.e., startups launched and sponsored by established firms), 457 academic spinouts (i.e., startups launched by faculty, students, or staff of a university), and 76 de novo other entrants (i.e., startups launched by individuals with no pre-entry biotech related experience). Next, I collected patent data including International Patent Classification (IPC) codes and priority dates for the parents and spinouts in my sample, using the European Patent Office (EPO) database. Finally, I searched the Orbis database to collect other firm-level information on spinouts and parents, including four-digit primary and secondary Standard Industry Classification (SIC) codes and incorporation dates. After combining all these data, I obtained a final sample of 117 spinouts.

4.2 | Measures

4.2.1 | Dependent variables

I constructed the dependent variables in this study in three steps. First, I compared the spinout's industry and technological trajectory with that of the parent using the SIC codes and patent data retrieved from the Orbis and EPO

databases, respectively. Specifically, I compared their four-digit primary and secondary SIC codes to construct the dichotomous variable *Same Industry*, which indicates whether the spinout entered the same industry as the parent firm. I also identified the 6-digit IPC codes stamped on the first patent filed by the spinout and compared them to the technological classes in the parent firm's patent portfolio to construct the dichotomous variable *Same Technology*, which indicates whether the spinout entered the same technological field as the parent firm. I considered only parent firms' patents with a priority date before the spinouts' date of incorporation. Second, following Sakakibara and Balasubramanian (2020), I computed the distance between the industry and the technological field of the spinout and the parent firm based on a dissimilarity measure. That is, to compute the distance between industry A and industry B, I pooled all the spinouts and parents in the sample and calculated the negative (log) ratio of the number of firms that operated in both industries to the total number of firms in either industry A or industry B.[7] Similarly, to measure the distance between technological classes A and B, I calculated the negative (log) ratio of the number of firms with patents in both technological classes to the total number of firms with patents in either class A or class B. A spinout that targeted the same industry or technological field (step 1 above) as the parent firm was valued 0. Following Sakakibara and Balasubramanian (2020), if none of the firms in the sample operated in both industry (technological class) A and industry (technological class) B, I assigned the maximum available distance to spinout–parent dyads. Third, based on information on industry choice derived in the previous steps, I classified the spinouts in my sample into three groups: (1) spinouts targeting the same industry as the parent firm (i.e., spinouts and parent firms with the same SIC codes); (2) spinouts entering a new but related industry (i.e., spinouts with different SIC codes from the parents but a distance between the two industries smaller than the sample median); and (3) spinouts entering a different industry unrelated to that of the parent firm (i.e., spinouts with different SIC codes and a distance between the two industries larger than the sample median). I then split the spinouts into three groups according to their technology choice compared to that of their parents: (1) spinouts targeting the same technological field as the parent firm (i.e., spinouts with the same IPC code as the parent firm); (2) spinouts in a different but related technological field (i.e., spinouts with a different IPC code but a distance between the two classes smaller than the sample median), and (3) spinouts in a different technological field unrelated to that of the parent firm (i.e., spinouts with a different IPC code and a distance between the two classes larger than the sample median).

4.2.2 | Independent variable

Using information on pre-founding conditions and underlying drivers of entrepreneurial activity gathered from company websites and the Bionity and Biocentury business directories, I constructed the variable *Spinout Type* which identifies three categories of spinouts: opportunity spinouts, necessity spinouts, and "other" spinouts. Building on prior studies (e.g., Bruneel et al., 2013; Buenstorf, 2009) and in the absence of evidence suggesting that an adverse development in the established firm had pushed founders to launch these new firms, I identified 68 opportunity spinouts created to exploit a new business opportunity discovered by founders. I also identified 37 necessity spinouts created by employees in response to adverse developments in their previous employer: 25 spinouts followed a merger (6 cases) or acquisition (19 cases) affecting the parent firm, and 11 were created following a strategic refocusing due to a change in top management (2 cases) or a major shift in corporate strategy (9 cases) and in 1 case parent firm bankruptcy. Overall, I was able to classify 105 of the sample spinouts as either opportunity or necessity spinouts. In the remaining 12 cases, I found no explicit information or convincing evidence of any of these reasons for firm foundation. All were contract research organizations providing consulting or research services to other firms. These "other" types of spinouts are more likely to be triggered by nonpecuniary motives such as autonomy and desire to be an entrepreneur (Astebro et al., 2011; Carnahan et al., 2012; Hurst & Pugsley, 2011), rather than the discovery of a new opportunity or response to unfavorable developments in the parent firm.

4.2.3 | Control variables

Key strategic decisions such as entry into a particular industry or technological field are influenced by the new firm founder's knowledge and prior experience in the industry (Fern et al., 2012; Phillips, 2002; Sakakibara & Balasubramanian, 2020). I included several variables to control for the effect of founding team characteristics such as the total *number of founders*, *main founder tenure* (measured as years of work experience in the parent firm), and *main founder education* (equal to 1 if the founder had a PhD degree). In the case of multiple founders, to identify the main founder or "ringleader" of each spinout activity I used information on founder's rank and description of the main tasks during previous employment (Shah et al., 2019). I also included two binary variables to control for presence in the founding team of *serial entrepreneurs* and *university affiliates*. Previous studies suggest that the complementary assets required to appropriate value from core knowledge are transferred by employees from parent to spinout (Agarwal & Shah, 2014; Campbell et al., 2012; Gambardella et al., 2015). Therefore, to analyze spinout's industry choice, I controlled for entry in the same technological field as the parent firm. To examine the spinout's technology strategy, I controlled for spinout in the same industry as the parent. Finally, I included the binary variable *founded during a recession* which equals 1 for spinouts launched in the recession year 2001 or during the period 2007–2009 (National Bureau of Economic Research, 2023).

5 | RESULTS

5.1 | Descriptive statistics

Table 1 presents the descriptive statistics and correlation coefficients. In my sample, 35% of the spinouts were operating in the same industry as the parent, and 32% had entered a different but related industry to that of the parent firm. A total of 77% of spinouts were operating in the same technological field as the parent with only 13% entering a different but related technological field to that of the parent. The average number of founders of the sample spinouts was 1.7. Prior to launching their own firms, these founders had an average of 5.86 years of work experience in the parent firm and 67% had a doctoral degree, suggesting that spinouts tend to be created by highly skilled and highly educated individuals which is consistent with the high-technology nature of the biotech field.

Figure 1 compares the industry and technological trajectory choices of the spinouts based on their organizational antecedents as a percentage distribution across opportunity and necessity spinouts. Among the necessity spinouts 73% (27 out of 37) were operating in the same industry as the parent firm—a significantly larger share than the 14.7% of opportunity spinouts (10 out of 68) that adopted a similar strategy ($t = 7.28$, df $= 103$, $p < 0.001$). Also, 91.9% of necessity spinouts (34 out of 37) were in the same technological field as the parent firm—again a significantly larger share than the 69.1% of opportunity spinouts (47 out of 68) that adopted this strategy ($t = 2.72$, df $= 103$, $p < 0.01$). However, 42.6% of opportunity spinouts entered a different but related industry to that of the parent firm, which is a significantly larger proportion than the 18.9% of necessity spinouts ($t = 2.5$, df $= 103$, $p < 0.01$). Finally, although the difference is not significant, 16.2% of opportunity spinouts entered a different but related technological field, again a larger share compared to the 8.1% of necessity spinouts adopting this strategy ($t = 1.16$, df $= 103$, $p > 0.1$).

5.2 | Multivariate analyses

Tables 2 and 3 report the results of the analyses testing Hypotheses 1 and 2. Table 2 presents the regression results for spinout choice of industry. Models 1–3 include only the main variable of interest which is a categorical variable for *Spinout Type*. Models 4–6 add the control variables. The coefficient and sign of the independent variable do not

TABLE 1 Descriptive statistics and correlation coefficients.

Variable ($N = 117$)	Mean	Std. dev.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Choice of industry																					
1. Same industry	0.35	0.48	0	1	1																
2. New industry (related)	0.32	0.47	0	1	−0.51	1															
3. New industry (unrelated)	0.32	0.47	0	1	−0.51	−0.48	1														
4. Industry distance	0.81	0.65	0	1.57	−0.92	0.15	0.79	1													
Choice of technology																					
5. Same technology	0.77	0.42	0	1	−0.02	0.12	−0.10	−0.04	1												
6. New tech. (related)	0.13	0.34	0	1	0.20	−0.05	−0.16	−0.23	−0.70	1											
7. New tech. (unrelated)	0.10	0.30	0	1	−0.19	−0.11	0.31	0.30	−0.62	−0.13	1										
8. Technology distance	0.22	0.52	0	1.99	−0.15	−0.13	0.29	0.26	−0.77	0.13	0.93	1									
Spinout type																					
9. Other spinouts	0.10	0.30	0	1	−0.01	−0.11	0.13	0.07	−0.02	−0.05	0.07	0.09	1								
10. Opportunity spinouts	0.58	0.50	0	1	−0.50	0.26	0.26	0.45	−0.22	0.12	0.17	0.18	−0.40	1							
11. Necessity spinouts	0.32	0.47	0	1	0.54	−0.20	−0.35	−0.53	0.24	−0.10	−0.23	−0.25	−0.23	−0.80	1						
12. Number of founders	1.70	0.83	1	4	0.03	0.10	−0.12	−0.08	0.14	−0.02	−0.18	−0.19	−0.22	0.07	0.07	1					
13. Main founder tenure	5.86	4.54	1	28	0.09	0.00	−0.09	−0.10	0.15	−0.15	−0.05	−0.13	0.04	−0.15	0.13	0.12	1				
14. Founder education	0.67	0.47	0	1	0.06	0.10	−0.17	−0.10	0.09	0.00	−0.12	−0.14	0.00	−0.09	0.09	−0.15	0.01	1			

TABLE 1 (Continued)

Variable ($N = 117$)	Mean	Std. dev.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
15. University affiliate	0.06	0.24	0	1	−0.03	0.13	−0.10	−0.03	0.05	0.01	−0.09	−0.08	−0.09	−0.01	0.06	0.31	−0.12	0.10	1		
16. Serial entrepreneur	0.26	0.44	0	1	0.06	−0.03	−0.03	−0.06	−0.14	0.18	−0.01	0.02	−0.07	0.06	−0.02	0.12	0.15	0.00	0.02	1	
17. Founded during a recession	0.21	0.41	0	1	−0.12	−0.01	0.13	0.15	0.04	−0.14	0.10	0.08	−0.18	0.19	−0.09	−0.04	0.03	0.10	−0.04	0.08	1

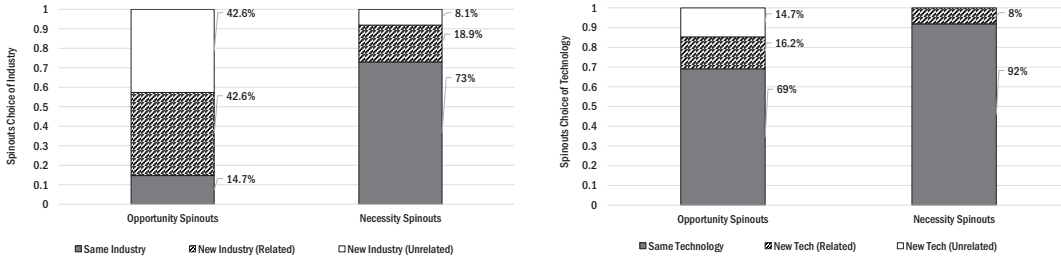

FIGURE 1 Distribution of spinout strategy by organizational antecedent.

change meaningfully with the inclusion of the controls, suggesting a limited effect of unobserved characteristics (Honoré, 2022; Lacetera et al., 2012). The dependent variable in model 4 is a binary variable which equals 1 if the spinout enters the same industry and 0 if it operates in an industry different from that of the parent firm. I therefore chose logistic regression as the estimation method. The coefficient of opportunity spinouts is negative but not significant in model 4 but is positive and significant for necessity spinouts ($\beta = 2.01$, $p < 0.05$), suggesting that new firms spawned out of necessity are 42.2% more likely than "other" spinouts (reference category) to target the same industry as the parent. The dependent variable in model 5 is a continuous variable that captures the distance between parent and spinout industries which suggests estimation using negative binomial regression. Again, the results indicate a positive but nonsignificant relationship between opportunity spinout and industry distance while the coefficient of necessity spinout is still negative and significant as in model 4. To account for nonlinearity in the relation between opportunity spinout and industry distance and directly test Hypothesis 1, I estimated a multinomial logistic regression model in which the dependent variable was a three-level categorical variable indicating whether spinout targets the same industry or enters a different industry close to or distant from that of the parent firm. In the left hand column in model 6 the coefficient of opportunity spinout is positive and significant ($\beta = 2.10$, $p < 0.05$), suggesting that compared to the other spinout types, opportunity spinouts are 29.4% more likely to target an industry that is related to that of the parent firm. In the right-hand column of model 6, the coefficient of opportunity spinout is not significant, indicating that this type of spinout is unlikely to enter an industry unrelated to the parent firm's industry.

Table 3 presents the results of the analysis for spinout technology choice. Models 1 to 3 include only the variable of interest (Spinout Type) and models 4–6 include the control variables. In model 4, the coefficient of necessity spinouts is positive and significant ($\beta = 1.79$, $p < 0.1$), suggesting that necessity spinouts compared to the reference category are 16.8% more likely to target the same technological field as the parent firm. Also, in the left hand column of model 6, the coefficient of opportunity spinouts is positive and significant ($\beta = 1.88$, $p < 0.05$), suggesting that spinouts spawned by opportunity are 15.9% more likely than the category other spinouts to enter a different but related technological field compared to that of the parent firm. Overall, the results support Hypotheses 1 and 2.

5.3 | Robustness checks

The analysis in Section 5.2 links the organizational antecedents of spinouts to the new firm's industry and technological trajectory choices. However, there are some drivers that are distinctive to necessity spinouts and merit separate treatment. For instance, although there are different types of adverse events that are disruptive to employees and their jobs in established firms, a merger or acquisition event causes major changes to the firm's ownership and organization. I conducted two additional tests distinguishing first between necessity spinouts triggered by a merger or acquisition and necessity spinouts triggered by a CEO change, a major shift in corporate strategy, or parent firm failure. Appendix Table B1 presents the results of these tests. In model 1, the coefficients of both types of necessity spinouts are positive and statistically significant, suggesting that merger or acquisition triggered spinouts and

TABLE 2 Logistic, negative binomial, and multinomial logistic regressions related to spinouts choice of industry.

Variables	(1) Same industry	(2) Industry distance	(3) New industry (related)	(3) New industry (unrelated)	(4) Same industry	(5) Industry distance	(6) New industry (related)	(6) New industry (unrelated)
Opportunity spinouts	−1.065 (0.705)	0.114 (0.220)	1.758* (0.945)	0.659 (0.746)	−1.249 (0.812)	0.106 (0.227)	2.104** (1.009)	0.768 (0.837)
Necessity spinouts	1.686** (0.719)	−1.119*** (0.354)	−0.657 (0.968)	−2.603*** (0.891)	2.011** (0.806)	−1.124*** (0.359)	−0.966 (0.987)	−2.868*** (1.024)
Number of founders					0.209 (0.317)	−0.073 (0.088)	−0.114 (0.335)	−0.330 (0.399)
Founder tenure					0.012 (0.053)	−0.006 (0.018)	0.004 (0.054)	−0.036 (0.073)
Founder education					0.354 (0.560)	−0.138 (0.135)	0.114 (0.616)	−0.802 (0.633)
University affiliate					−1.299 (0.996)	0.0575 (0.249)	1.441 (1.030)	0.639 (1.307)
Serial entrepreneur					0.445 (0.530)	−0.108 (0.149)	−0.454 (0.586)	−0.485 (0.649)
Same technology					−1.328** (0.623)	0.181 (0.162)	1.670** (0.705)	1.143 (0.698)
Founded during a recession					−0.515 (0.629)	0.182 (0.131)	0.194 (0.717)	0.899 (0.706)
Constant	−0.693 (0.615)	−0.061 (0.212)	−0.693 (0.870)	0.405 (0.648)	−0.361 (0.852)	0.033 (0.274)	−1.938* (1.110)	0.801 (0.959)
Observations	117	117	117	117	117	117	117	117
ll	−57.62	−115.9	−108.4	−108.4	−53.92	−114.9	−100.9	−100.9
Chi^2	29.60***	18.20***	31.00***	31.00***	33.83***	29.36***	42.10***	42.10***
r2_p	0.240	0.079	0.156	0.156	0.289	0.087	0.215	0.215

Note: Other spinouts are the reference category. Robust standard errors in parentheses.
***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

TABLE 3 Logistic, negative binomial, and multinomial logistic regressions related to spinouts choice of technology.

	(1)	(2)	(3)		(4)	(5)	(6)	
Variables	Same tech.	Tech. distance	New tech. (related)	New tech. (unrelated)	Same tech.	Tech. distance	New tech. (related)	New tech. (unrelated)
Opportunity spinouts	−0.293 (0.720)	−0.169 (0.636)	0.745 (1.111)	−0.043 (0.860)	−0.815 (0.806)	−0.055 (0.592)	1.875** (0.948)	0.140 (0.866)
Necessity spinouts	1.329 (0.902)	−2.401*** (0.813)	−0.230 (1.219)	−16.05*** (0.804)	1.793* (0.919)	−2.066*** (0.728)	−0.829 (1.054)	−15.42*** (0.921)
Number of founders					0.709** (0.338)	−0.756** (0.301)	−0.331 (0.378)	−1.092** (0.501)
Founder tenure					0.106 (0.096)	−0.079 (0.080)	−0.193* (0.107)	−0.029 (0.114)
Founder education					0.475 (0.516)	−0.685* (0.377)	−0.113 (0.724)	−0.927 (0.667)
University affiliate					−0.453 (1.238)	0.071 (1.240)	0.176 (1.306)	−13.36*** (1.132)
Serial entrepreneur					−1.026* (0.559)	0.166 (0.443)	1.761** (0.737)	0.309 (0.802)
Same industry					−1.337** (0.629)	0.008 (0.412)	2.410*** (0.876)	−0.396 (1.289)
Founded during a recession					0.609 (0.626)	0.320 (0.481)	−2.086** (1.024)	0.359 (0.760)
Constant	1.099 (0.670)	−1.038* (0.590)	−2.197** (1.059)	−1.505* (0.785)	0.012 (1.120)	0.621 (0.828)	−2.645** (1.305)	0.522 (1.455)
Observations	117	117	117	117	117	117	117	117
ll	−59.19	−61.96	−75.64	−75.64	−51.76	−57.01	−60.33	−60.33
Chi^2	6.046**	14.18***	1999***	1999***	16.92*	27.00***	1710***	1710***
r2_p	0.063	0.081	0.075	0.075	0.181	0.154	0.262	0.262

Note: Other spinouts are the reference category. Robust standard errors in parentheses.
***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

spinouts resulting from a strategic refocusing or exit of the parent firm are, respectively, 36.8 and 53.7% more likely to operate in the same industry as the parent firm. In model 4, the estimated coefficient of necessity spinouts triggered by strategic refocusing or involuntary exit is positive and significant, suggesting that this type of necessity spinout is 17.7% more likely to remain in the same technological field as the parent firm. However, the coefficient of necessity spinouts triggered by a merger or acquisition although statistically significant has little economic significance.

Second, I excluded merger or acquisition triggered spinouts (25 observations) and reestimated the results. Appendix Table B2 shows that the coefficients of necessity spinouts in models 1 and 4 are positive and significant, suggesting that compared to the reference group (other spinouts), these spinouts are 51.3% more likely to operate in the same industry and are 16.8% more likely to operate in the same technological field as the parent. In models 3 and 6 left hand columns, the positive and significant coefficients of opportunity spinouts support the previous findings that compared to the reference group, opportunity spinouts are 30.7% more likely to enter a different but related industry and are 12.8% more likely to enter a different but related technological field compared to the parent firm. Overall, these findings indicate that the strategic choices about industry sector and technology made by necessity spinouts are not driven by a specific type of adverse event in the parent firm.

Next, I excluded the category other spinouts (i.e., 12 spinouts that could not be classified as either opportunity or necessity spinouts) and tested Hypotheses 1 and 2 using a binary variable that takes the value 1 for opportunity spinouts and 0 for necessity spinouts as the independent variable. The results (not reported here) supported Hypotheses 1 and 2.

6 | DISCUSSION AND CONCLUSION

Employee entrepreneurship is often considered "an endogenous response to opportunities generated by investments in new knowledge made by incumbent firms and organizations but which are unable to completely and exhaustively commercialize" (Audretsch & Keilbach, 2007, p. 1244). However, there is some evidence suggesting that adverse developments in the employing firm that are disruptive to the employee's job represent another driver of entrepreneurship (Bruneel et al., 2013; Buenstorf, 2009). In this study, I examined how the organizational antecedents of spinouts influenced the new firms' strategic choices compared to those of the parent firms. Based on a sample of 117 spinouts and their parents, I hypothesized and showed empirically that spinouts launched to exploit new opportunities that are ignored by the parent firm tend to enter a different but related industry and technological field to those of the parent firm. I showed also that spinouts triggered by adverse developments in established firms are more likely to target the same industry and the same technological field as the parent.

6.1 | Theoretical contributions

This article contributes to two research streams. First, it provides a more nuanced understanding of the spinout formation process and origins of spinouts' strategies. Most spinout formation theories refer to undervaluation or underutilization of employees' innovative ideas as being the main driver of spinout activity and entrepreneurship among former employees (Agarwal et al., 2004; Cassiman & Ueda, 2006; Gambardella et al., 2015). A few, instead, propose the idea of developments in the established firm that are unfavorable to employees and their jobs can also encourage employee entrepreneurship (Bruneel et al., 2013; Buenstorf, 2009; Eriksson & Kuhn, 2006; Kim, 2022; Rocha et al., 2018). The present study contributes by linking the drivers of employee entrepreneurship to the resulting spinout's strategic trajectory compared to that of the parent firm. Given that employees turned founders acquire their knowledge and skills through previous employment experience in the focal industry, spinouts are often assumed to be formed in the same industry as the parent firms (Agarwal et al., 2004; Agarwal et al., 2016; Chatterji, 2009;

Franco & Filson, 2006; Klepper & Sleeper, 2005). In fact, some studies describe employee entrepreneurship as *intra-industry* firm formation by former employees of an established firm (e.g., Ganco, 2013). However, the findings from the present study suggest that while necessity spinouts are likely to target the same industry as the parent, spinouts launched to pursue undervalued or underutilized business opportunities tend to enter a different industry from that of the parent firm. The analysis, therefore, shows that there is heterogeneity in the organizational antecedents of spinouts and that ultimately this heterogeneity shapes the strategic trajectory of the spinout. This result has important implications for the broader strategy literature and the sources of heterogeneity in the initial strategy choices made by new firms (Gruber et al., 2013). Rather than founders' prior experience (e.g., Fern et al., 2012), founding team composition (e.g., Beckman, 2006) or organizational environment (e.g., Johnson, 2007), I show that the reason for choosing entrepreneurship has a major influence on the new firm's industry and technology choices.

Second, this study contributes to work on necessity entrepreneurship, often represented as the creation of a small business with low growth potential by a low-skilled individual whose only employment option is self-employment (Acs, 2006; Alvarez & Barney, 2014; Banerjee & Duflo, 2007). However, some recent research suggests that highly educated and highly skilled individuals may also face the pressure to become necessity entrepreneurs. For example, Dencker et al. (2021) argue that experienced managers and professionals who become unemployed or well-educated graduates unable to secure employment will become necessity entrepreneurs. The present study contributes in two ways. First, it adds some nuance to our understanding of the "push factors" driving the transition of high-skilled individuals to self-employment (O'Donnell et al., 2024). While prior research assumes that necessity entrepreneurs "often come from the ranks of unemployment" (Dencker et al., 2021; Nikiforou et al., 2019, p. 2183), my findings suggest that skilled professionals may choose to opt out of waged employment to escape deteriorating employment conditions in the employer firms. Second, compared to opportunity entrepreneurs, necessity entrepreneurs are assumed to have lower levels of human and social capital and financial resources, and fewer managerial skills (O'Donnell et al., 2024) which assumes in turn that startups by necessity entrepreneurs are lower quality and less innovative (Burtch et al., 2018; Dencker et al., 2021) than other startup types. However, this study suggests that spinouts triggered by adverse developments in established firms not only have access to a similar level of knowledge resources as opportunity spinouts (Buenstorf, 2009) but also take advantage of business opportunities initiated in the former employer. This means that the growth prospects of necessity spinouts and opportunity spinouts are similar and especially in high-technology contexts.

6.2 | Limitations and future research

This work has some limitations that need to be considered then interpreting the findings. They also suggest directions for future research. First, my identification of opportunity and necessity spinouts relies on information on spinout pre-founding conditions and the reasons underlying entrepreneurial activity by former employees of established firms. I define opportunity spinouts as new firms launched to exploit a business opportunity ignored by the previous employer and necessity spinouts as new firm establishment as a response to deteriorating employment conditions caused by adverse developments in the previous employer. However, it is possible that a necessity spinout founder might have identified a business opportunity during the course of their employment (Buenstorf, 2009) or through exposure to other sources of information. In these cases, the business opportunity is likely to have little overlap with the founders' knowledge and experience base since its identification did not immediately trigger entrepreneurial activity. Therefore, while I believe that founders of necessity spinouts are more likely to capitalize on their specific human capital endowments and take on activities and projects discontinued as a result of adverse developments, future research could explore the conditions driving necessity entrepreneurs to pursue a business opportunity unrelated to the parent firm. Further, the data do not allow me to directly observe the effects of adverse events in the established firm on employees' jobs. Given that all the spinout founders in my sample transitioned from employment to self-employment within the same year, this would suggest that adverse developments and deteriorating

employment conditions were the cause of employee departure to engage in entrepreneurship. Further research using more fine-grained data could examine how other factors than adverse events in the established firms might disrupt jobs and lead to the formation of spinout firms. Finally, founders of opportunity spinouts might have identified an entrepreneurial opportunity through exposure to other sources of information such as previous employment spells or education. Indeed, prior research suggests that entrepreneurs often have varied previous career experience (e.g., Chen & Thompson, 2016). While I cannot exclude the possibility that an opportunity spinout founder identified the entrepreneurial opportunity from some other than the most recent experience in the parent firm, this alternative explanation seems less plausible. However, future research could explore how founders' prior employment experience shapes their spinout firms' strategic trajectories.

Second, the empirical setting of this study is the European biotech industry, a knowledge-intensive and technology-oriented industry with a high propensity for patenting (Arundel & Kabla, 1998). The strength of the intellectual property regime in this industry might limit the generalizability of the findings since the parent firm's intellectual property rights might not only discourage spinout formation but also might affect the strategic positioning of any spinouts in the industry or technological landscape. Although prior research suggests that individuals can circumvent even strong intellectual property rights by capitalizing on their tacit knowledge (Agarwal & Shah, 2014; Gambardella et al., 2015), future work could investigate the strategic trajectories of spinouts in industries characterized by weak appropriability regimes.

Third, all the spinouts in my sample are VC-backed firms. Strategic decisions in the initial stages of firm formation including choice of industry or technological field, are influenced by a range of factors including involvement of VC firms. To control for this, I compared the spinouts' first patent application date with the time they received their first round of VC funding. In my sample, 12.8% of spinouts received their first VC investment before filing their first patent. I tested my hypotheses using the subsample of spinouts that received their VC investment after first patenting activity and the results were similar. This suggests strongly that although affiliation to an established firm is likely to reduce uncertainty for external investors, potential hostile actions from parent firms would likely reduce external investors' confidence in funding the spinout (Bae & Lee, 2021) and lead to their waiting for evidence of legitimacy, for example, first patent application. Therefore, while it is reasonable to expect that VC equity ownership or presence on the spinout firm board will affect the strategic trajectory of the firm, I believe this is likely to apply throughout the spinout's life and not just in the early stages. However, future research using finer-grained data could determine whether the spinout's strategic choices are affected by type of investor.

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ENDNOTES

[1] Entrepreneurial firms launched by previous employees of an established firms are termed employee spinouts (Kaul et al., 2024) or spinouts (Agarwal et al., 2004; Ganco, 2013). Unlike corporate spinoffs, these stand-alone startups receive no formal support from and have no ownership ties with other firms operating in the industry (Campbell et al., 2012; Honoré, 2022; Kim & Steensma, 2017).

[2] Interview with the founder conducted by the author on October 13, 2021.

[3] Nick Manes, "How Pfizer's closure planted a thousand seeds in Ann Arbor," September 2021 available at https://www.crainsdetroit.com/technology/how-pfizers-closure-planted-thousand-seeds-ann-arbor.

[4] A shift in the firm's strategy following the appointment of a new CEO may also result in some level of disagreement (Klepper & Thompson, 2010) or friction (Moore & Davis, 2004) between employees and the firm's management. However, Shah et al. (2019) note that there is very little systematic evidence supporting this argument.

[5] Note that not all firm level developments have an adverse effect on the firm's employees and do not necessarily decrease the desirability of continuing their employment in the firm. For instance, abandonment of some research activities and projects might be the result of a consensus between employees and the firm's new management in which case any change to individual jobs is unlikely to reduce the desirability of continued employment in the firm.

[6] ThomsonOne's Venturexpert and CB Insights' VentureSource include detailed financial information on VC-backed companies, their investors, and executives. Both data sources have been used in prior studies to investigate different aspects of employee entrepreneurship (see Bae & Lee, 2021; Chatterji, 2009; Gompers et al., 2005).

[7] For example, 29 firms in my sample were in the commercial physical and biological research industry—SIC code 8731, including 8 with pharmaceutical preparations industry activities—SIC code 2834. Then, 24 of the sample firms were active in the pharmaceutical industry but not the biological research sector. The distance between industries 8731 and 2834 was computed as 0.88, which is the negative log of 8 divided by 61 (the sum of 29 and 32, reflecting the number of firms in either industry).

REFERENCES

Acs, Z. (2006). How is entrepreneurship good for economic growth. *Innovations*, *1*(1), 97–107.

Adams, P., Bahoo-Torodi, A., Fontana, R., & Malerba, F. (2024). Employee spinouts along the value chain. *Industrial and Corporate Change*, *33*(1), 90–105.

Adams, P., Fontana, R., & Malerba, F. (2016). User-industry spinouts: Downstream industry knowledge as a source of new firm entry and survival. *Organization Science*, *27*(1), 18–35.

Agarwal, R., Audretsch, D., & Sarkar, M. B. (2007). The process of creative construction: Knowledge spillovers, entrepreneurship, and economic growth. *Strategic Entrepreneurship Journal*, *1*(3–4), 263–286.

Agarwal, R., Audretsch, D., & Sarkar, M. B. (2010). Knowledge spillovers and strategic entrepreneurship. *Strategic Entrepreneurship Journal*, *4*(4), 271–283.

Agarwal, R., Campbell, B., Franco, A., & Ganco, M. (2016). What do I take with me? The mediating effect of spin-out team size and tenure on the founder-firm performance relationship. *Academy of Management Journal*, *59*(3), 1060–1087.

Agarwal, R., Campbell, B. A., Carnahan, S., & Choi, J. (2020). Flying high or crashing down? Pre-entry knowledge and the distribution of startup performance. SSRN scholarly paper no. ID 3644518. Rochester, NY: Social Science Research Network.

Agarwal, R., Echambadi, R., Franco, A., & Sarkar, M. B. (2004). Knowledge transfer through inheritance: Spin-out generation, growth, and survival. *Academy of Management Journal*, *47*(4), 501–522.

Agarwal, R., & Shah, S. K. (2014). Knowledge sources of entrepreneurship: Firm formation by academic, user and employee innovators. *Research Policy*, *43*(7), 1109–1133.

Alvarez, S. A., & Barney, J. B. (2007). Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal*, *1*(1–2), 11–26.

Alvarez, S. A., & Barney, J. B. (2014). Entrepreneurial opportunities and poverty alleviation. *Entrepreneurship Theory and Practice*, *38*(1), 159–184.

Amit, R., & Muller, E. (1995). "Push" and "pull" entrepreneurship. *Journal of Small Business & Entrepreneurship*, *12*(4), 64–80.

Anton, J., & Yao, D. (1995). Start-ups, spin-offs, and internal projects. *Journal of Law, Economics and Organization*, *11*(2), 362–378.

Arundel, A., & Kabla, I. (1998). What percentage of innovations are patented? Empirical estimates for European firms. *Research Policy*, *27*(2), 127–141.

Astebro, T., Chen, J., & Thompson, P. (2011). Stars and misfits: Self-employment and labor market frictions. *Management Science*, *57*(11), 1999–2017.

Audretsch, D. B., & Keilbach, M. (2007). The theory of knowledge spillover entrepreneurship. *Journal of Management Studies*, *44*(7), 1242–1254.

Bae, J., & Lee, J. M. (2021). How technological overlap between spinouts and parent firms affects corporate venture capital investments in spinouts: The role of competitive tension. *Academy of Management Journal*, *64*(2), 643–678.

Bahoo-Torodi, A., & Torrisi, S. (2022). When do spinouts benefit from market overlap with parent firms? *Journal of Business Venturing*, *37*(6), 106249.

Banerjee, A. V., & Duflo, E. (2007). The economic lives of the poor. *Journal of Economic Perspectives*, *21*(1), 141–168.

Bankman, J., & Gilson, R. J. (1999). Why start-ups? *Stanford Law Review*, *51*, 289–308.
Beckman, C. M. (2006). The influence of founding team company affiliations on firm behavior. *Academy of Management Journal*, *49*(4), 741–758.
Block, J. H., Kohn, K., Miller, D., & Ullrich, K. (2015). Necessity entrepreneurship and competitive strategy. *Small Business Economics*, *44*, 37–54.
Block, J. H., & Wagner, M. (2010). Necessity and opportunity entrepreneurs in Germany: Characteristics and earning s differentials. *Schmalenbach Business Review*, *62*, 154–174.
Boeker, W. (1988). Organizational origins: Entrepreneurial and environmental imprinting at time of founding. In G. R. Carroll (Ed.), *Ecological models of organizations* (pp. 33–51). Ballinger.
Brewer, J., & Gibson, S. W. (Eds.). (2014). *Necessity entrepreneurs: Microenterprise education and economic development*. Edward Elgar Publishing.
Bruneel, J., Van de Velde, E., & Clarysse, B. (2013). Impact of the type of corporate spin–off on growth. *Entrepreneurship Theory and Practice*, *37*(4), 943–959.
Buenstorf, G. (2007). Evolution on the shoulders of giants: Entrepreneurship and firm survival in the German laser industry. *Review of Industrial Organization*, *30*(3), 179–202.
Buenstorf, G. (2009). Opportunity spin-offs and necessity spin-offs. *International Journal of Entrepreneurial Venturing*, *1*(1), 22–40.
Burtch, G., Carnahan, S., & Greenwood, B. N. (2018). Can you gig it? An empirical examination of the gig economy and entrepreneurial activity. *Management Science*, *64*(12), 5497–5520.
Burton, M. D., Sørensen, J. B., & Beckman, C. M. (2002). Coming from good stock: Career histories and new venture formation. In M. Lounsbury & M. Ventresca (Eds.), *Research in the sociology of organizations* (Vol. 19, pp. 229–262). JAI Press.
Campbell, B. A., Ganco, M., Franco, A. M., & Agarwal, R. (2012). Who leaves, where to, and why worry? Employee mobility, employee entrepreneurship, and effects on source firm performance. *Strategic Management Journal*, *33*(1), 65–87.
Carnahan, S., Agarwal, R., & Campbell, B. A. (2012). Heterogeneity in turnover: The effect of relative compensation dispersion of firms on the mobility and entrepreneurship of extreme performers. *Strategic Management Journal*, *33*(12), 1411–1430.
Carroll, G. R., Bigelow, L. S., Seidel, M. D. L., & Tsai, L. B. (1996). The fates of de novo and de alio producers in the American automobile industry 1885–1981. *Strategic Management Journal*, *17*(S1), 117–137.
Cassiman, B., & Ueda, M. (2006). Optimal project rejection and new firm start-ups. *Management Science*, *52*(2), 262–275.
Chatterjee, S., & Rossi-Hansberg, E. (2012). Spinoffs and the market for idea. *International Economic Review*, *53*(1), 53–93.
Chatterji, A. K. (2009). Spawned with a silver spoon? Entrepreneurial performance and innovation in the medical device industry. *Strategic Management Journal*, *30*(2), 185–206.
Chen, L. W., & Thompson, P. (2016). Skill balance and entrepreneurship evidence from online career histories. *Entrepreneurship Theory and Practice*, *40*(2), 289–305.
Christensen, C. M. (1993). The rigid disk drive industry: A history of commercial and technological turbulence. *Business History Review*, *67*(4), 531–588.
Dahl, M. S., & Reichstein, T. (2007). Are you experienced? Prior experience and the survival of new organizations. *Industry and Innovation*, *14*(5), 497–511.
Dahlstrand, A. (1997). Growth and innovativeness in technology-based spin-offs. *Research Policy*, *26*, 331–344.
De Figueiredo, R. J., Meyer-Doyle, P., & Rawley, E. (2013). Inherited agglomeration effects in hedge fund spawns. *Strategic Management Journal*, *34*(7), 843–862.
Dencker, J. C., Bacq, S., Gruber, M., & Haas, M. (2021). Reconceptualizing necessity entrepreneurship: A contextualized framework of entrepreneurial processes under the condition of basic needs. *Academy of Management Review*, *46*(1), 60–79.
Dencker, J. C., & Gruber, M. (2015). The effects of opportunities and founder experience on new firm performance. *Strategic Management Journal*, *36*(7), 1035–1052.
Dencker, J. C., Gruber, M., & Shah, S. K. (2009). Pre-entry knowledge, learning, and the survival of new firms. *Organization Science*, *20*(3), 516–537.
Elfenbein, D. W., Hamilton, B. H., & Zenger, T. R. (2010). The small firm effect and the entrepreneurial spawning of scientists and engineers. *Management Science*, *56*(4), 659–681.
Eriksson, T., & Kuhn, J. M. (2006). Firm spin-offs in Denmark 1981–2000—Patterns of entry and exit. *International Journal of Industrial Organization*, *24*(5), 1021–1040.
Feldman, M. P., Ozcan, S., & Reichstein, T. (2019). Falling not far from the tree: Entrepreneurs and organizational heritage. *Organization Science*, *30*(2), 337–360.
Fern, M. J., Cardinal, L. B., & O'Neill, H. M. (2012). The genesis of strategy in new ventures: Escaping the constraints of founder and team knowledge. *Strategic Management Journal*, *33*(4), 427–447.

Ferriani, S., Garnsey, E., & Lorenzoni, G. (2012). Continuity and change in a spin-off venture: The process of reimprinting. *Industrial and Corporate Change*, *21*(4), 1011–1048.

Franco, A., & Filson, D. (2006). Spin-outs: Knowledge diffusion through employee mobility. *RAND Journal of Economics*, *37*, 841–860.

Franco, A. M., Sarkar, M. B., Agarwal, R., & Echambadi, R. (2009). Swift and smart: The moderating effects of technological capabilities on the market pioneering–firm survival relationship. *Management Science*, *55*(11), 1842–1860.

Gambardella, A., Ganco, M., & Honoré, F. (2015). Using what you know: Patented knowledge in incumbent firms and employee entrepreneurship. *Organization Science*, *26*(2), 456–474.

Ganco, M. (2013). Cutting the Gordian knot: The effect of knowledge complexity on employee mobility and entrepreneurship. *Strategic Management Journal*, *34*(6), 666–686.

Garvin, D. A. (1983). Spin-offs and the new firm formation process. *California Management Review*, *25*(2), 3–20.

Gompers, P., Lerner, J., & Scharfstein, D. (2005). Entrepreneurial spawning: Public corporations and the genesis of new ventures, 1986 to 1999. *The Journal of Finance*, *60*(2), 577–614.

Graebner, M. E., & Eisenhardt, K. M. (2004). The seller's side of the story: Acquisition as courtship and governance as syndicate in entrepreneurial firms. *Administrative Science Quarterly*, *49*(3), 366–403.

Gruber, M., Dencker, J. C., & Nikiforou, A. (2024). How founder human capital and founding conditions shape new firm performance: A study of necessity entrepreneurship during times of economic crisis. *Academy of Management Journal*, *67*(2), 382–406.

Gruber, M., MacMillan, I. C., & Thompson, J. D. (2013). Escaping the prior knowledge corridor: What shapes the number and variety of market opportunities identified before market entry of technology start-ups? *Organization Science*, *24*(1), 280–300.

Haspeslagh, P. C., & Jemison, D. B. (1991). *Managing acquisitions: Creating value through corporate renewal*. Free Press.

Helfat, C. E., & Lieberman, M. B. (2002). The birth of capabilities: Market entry and the importance of pre-history. *Industrial and Corporate Change*, *11*(4), 725–760.

Helfat, C. E., & Raubitschek, R. S. (2000). Product sequencing: co-evolution of knowledge, capabilities and products. *Strategic Management Journal*, *21*(10–11), 961–979.

Hellmann, T. (2007). When do employees become entrepreneurs? *Management Science*, *53*(6), 919–933.

Henderson, R. (1993). Underinvestment and incompetence as responses to radical innovation: Evidence from the photolithographic alignment equipment industry. *The Rand Journal of Economics*, *24*, 248–270.

Honoré, F. (2022). Joining forces: How can founding members' prior experience variety and shared experience increase startup survival? *Academy of Management Journal*, *65*(1), 248–272.

Hurst, E., & Pugsley, B. W. (2011). What do small businesses do? (No. w17041). National Bureau of Economic Research.

Johnson, V. (2007). What is organizational imprinting? Cultural entrepreneurship in the founding of the Paris Opera. *American Journal of Sociology*, *113*(1), 97–127.

Kaul, A., Ganco, M., & Raffiee, J. (2024). When subjective judgments lead to spinouts: Employee entrepreneurship under uncertainty, firm-specificity, and appropriability. *Academy of Management Review*, *49*(2), 215–248.

Kim, J. D. (2022). Startup acquisitions, relocation, and employee entrepreneurship. *Strategic Management Journal*, *43*(11), 2189–2216.

Kim, J. Y., & Steensma, H. K. (2017). Employee mobility, spin-outs, and knowledge spill-in: How incumbent firms can learn from new ventures. *Strategic Management Journal*, *38*(8), 1626–1645.

Klepper, S. (2007). Disagreements, spinoffs, and the evolution of Detroit as the capital of the U.S. automobile industry. *Management Science*, *53*(4), 616–663.

Klepper, S., & Sleeper, S. (2005). Entry by spin-offs. *Management Science*, *51*(8), 1291–1306.

Klepper, S., & Thompson, P. (2010). Disagreements and intra-industry spinoffs. *International Journal of Industrial Organization*, *28*(5), 526–538.

Lacetera, N., Pope, D. G., & Sydnor, J. R. (2012). Heuristic thinking and limited attention in the car market. *American Economic Review*, *102*(5), 2206–2236.

Lazear, E. P. (2005). Entrepreneurship. *Journal of Labor Economics*, *23*, 649–680.

Life Science Sweden. (2013). Bolagen efter Astrazenecas nedläggningar. Retrieved from https://lifesciencesweden.se/article/view/475973

Marquis, C., & Tilcsik, A. (2013). Imprinting: Toward a multilevel theory. *The Academy of Management Annals*, *7*(1), 195–245.

Maslow, A. H. (1954). *Motivation and personality*. Harper and Row.

McMullen, J. S., Bagby, D. R., & Palich, L. E. (2008). Economic freedom and the motivation to engage in entrepreneurial action. *Entrepreneurship Theory and Practice*, *32*(5), 875–895.

McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, *31*(1), 132–152.

Miller, C. C., Cardinal, L. B., & Glick, W. H. (1997). Retrospective reports in organizational research: A reexamination of recent evidence. *Academy of Management Journal*, *40*(1), 189–204.

Moore, G., & Davis, K. (2004). Learning the silicon valley way. In T. Bresnahan & A. Gambardella (Eds.), *Building high-tech clusters: Silicon valley and beyond* (Vol. 7, p. 36). Cambridge University Press.

National Bureau of Economic Research. (2023). *US business cycle expansions and contractions*. Retrieved from http://www.nber.org/cycles.html

Neal, D. (1995). Industry-specific human capital: Evidence from displaced workers. *Journal of Labor Economics*, *13*(4), 653–677.

Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change*. Harvard University Press.

Nikiforou, A., Dencker, J. C., & Gruber, M. (2019). Necessity entrepreneurship and industry choice in new firm creation. *Strategic Management Journal*, *40*(13), 2165–2190.

O'Donnell, P., Leger, M., O'Gorman, C., & Clinton, E. (2024). Necessity entrepreneurship. *Academy of Management Annals*, *18*(1), 44–81.

Phillips, D. J. (2002). A genealogical approach to organizational life chances: The parent-progeny transfer among Silicon Valley law firms, 1946–1996. *Administrative Science Quarterly*, *47*(3), 474–506.

Poschke, M. (2013). 'Entrepreneurs out of necessity': A snapshot. *Applied Economics Letters*, *20*(7), 658–663.

Puranam, P., Singh, H., & Zollo, M. (2006). Organizing for innovation: Managing the coordination-autonomy dilemma in technology acquisitions. *Academy of Management Journal*, *49*(2), 263–280.

Reynolds, P. D., Hay, M., Bygrave, W. D., Camp, S. M., & Autio, E. (2000). *Global entrepreneurship monitor: 2000 executive report*. Kauffman Center for Entrepreneurial Leadership.

Ritsilä, J., & Tervo, H. (2002). Effects of unemployment on new firm formation: Micro-level panel data evidence from Finland. *Small Business Economics*, *19*(1), 31–40.

Rocha, V., Carneiro, A., & Varum, C. (2018). Leaving employment to entrepreneurship: The value of co-worker mobility in pushed and pulled-driven start-ups. *Journal of Management Studies*, *55*(1), 60–85.

Sakakibara, M., & Balasubramanian, N. (2020). Human capital, parent size, and the destination industry of spinouts. *Strategic Management Journal*, *41*(5), 815–840.

Shah, S. K., Agarwal, R., & Echambadi, R. (2019). Jewels in the crown: Exploring the motivations and team building processes of employee entrepreneurs. *Strategic Management Journal*, *40*(9), 1417–1452.

Shah, S. K., & Tripsas, M. (2007). The accidental entrepreneur: The emergent and collective process of user entrepreneurship. *Strategic Entrepreneurship Journal*, *1*(1–2), 123–140.

Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, *11*(4), 448–469.

Shane, S., & Stuart, T. (2002). Organizational endowments and the performance of university start-ups. *Management Science*, *48*(1), 154–170.

Shapero, A. (1975). The displaced, uncomfortable entrepreneur. *Psychology Today*, *9*(6), 83–88.

Shapero, A. (1982). Social dimensions of entrepreneurship. In C. Kent, et al. (Eds.), *The encyclopedia of entrepreneurship* (pp. 72–90). Prentice-Hall.

Shepherd, D. A., & DeTienne, D. R. (2005). Prior knowledge, potential financial reward, and opportunity identification. *Entrepreneurship Theory and Practice*, *29*(1), 91–112.

Shepherd, D. A., McMullen, J. S., & Jennings, P. D. (2007). The formation of opportunity beliefs: Overcoming ignorance and reducing doubt. *Strategic Entrepreneurship Journal*, *1*(1–2), 75–95.

Sørensen, J. B., & Fassiotto, M. A. (2011). Organizations as fonts of entrepreneurship. *Organization Science*, *22*(5), 1322–1331.

Souitaris, V., Zerbinati, S., Peng, B., & Shepherd, D. (2020). Should I stay or should I go? Founder power and exit via initial public offering. *Academy of Management Journal*, *63*(1), 64–95.

Stuart, T. E., & Sorenson, O. (2003). Liquidity events and the geographic distribution of entrepreneurial activity. *Administrative Science Quarterly*, *48*(2), 175–201.

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, *17*(S2), 27–43.

Teece, D. J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, *15*(6), 285–305.

Vanacker, T., Forbes, D. P., Knockaert, M., & Manigart, S. (2020). Signal strength, media attention, and resource mobilization: Evidence from new private equity firms. *Academy of Management Journal*, *63*(4), 1082–1105.

Walter, S. G., Heinrichs, S., & Walter, A. (2014). Parent hostility and spin-out performance. *Strategic Management Journal*, *35*(13), 2031–2042.

Welter, F., Baker, T., Audretsch, D. B., & Gartner, W. B. (2017). Everyday entrepreneurship—A call for entrepreneurship research to embrace entrepreneurial diversity. *Entrepreneurship Theory and Practice*, *41*(3), 311–321.

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APPENDIX A: EXPLORATORY INTERVIEW

I conducted interviews with the founders of 14 spinouts during winter 2016/2017. The spinouts were identified using a sample of Italian biotech startups implementing a similar approach to that outlined in Section 4.1. The interviews were semistructured and used both Likert-scales and open-ended questions which have been shown to provide higher accuracy in the case of retrospective reporting (Graebner & Eisenhardt, 2004; Miller et al., 1997). The interview protocol included five sections related to (i) the main activities and core businesses of the cases, (ii) the founder's career history and education background; (iii) entrepreneurial opportunity and founding process; (iv) transfer of knowledge and resources from previous employment experiences; and (v) spinout technological and market capabilities, products (services), and patents. The interviews were conducted through Skype and lasted between 60 and 120 min. All spinouts were still operating at the time of writing. The longest-surviving case was founded in 2001, and the most recent was founded in 2013. Spinouts were founded by 3.36 founders on average; 78.6% of the main founders (12 out of 14) were male, and 64.2% (9 out of 14) were doctoral or masters graduates. On average, at the time of spinout founding, the main founders had 6.64 years of experience working in the parent organization, and (an additional) 7.43 years of employment experience in other companies. In line with previous studies (e.g., Souitaris et al., 2020; Vanacker et al., 2020), I used these interviews to complement and substantiate the theoretical arguments in this article.

APPENDIX B: ROBUSTNESS CHECKS

TABLE B1 Exploring the heterogeneity within the necessity spinouts category.

	Spinouts choice of industry				Spinouts choice of technology			
	(1)	(2)	(3)		(4)	(5)	(6)	
Variables	Same industry	Industry distance	New industry (related)	New industry (unrelated)	Same tech.	Tech. distance	New tech. (related)	New tech. (unrelated)
Opportunity spinouts	−1.224 (0.809)	0.101 (0.226)	2.083** (1.007)	0.740 (0.835)	−0.815 (0.807)	−0.055 (0.592)	1.887** (0.947)	0.140 (0.866)
Necessity spinouts								
Merger and acquisition	1.729** (0.820)	−0.904** (0.374)	−0.795 (1.007)	−2.367** (1.020)	1.712* (1.036)	−2.088** (0.846)	−0.667 (1.160)	−15.49*** (0.863)
Strategic refocusing or involuntary exit	2.818** (1.193)	−1.837*** (0.699)	−1.403 (1.300)	−16.83*** (0.854)	1.989* (1.063)	−2.017* (1.037)	−1.269 (1.134)	−15.23*** (1.235)
N. founders	0.219 (0.312)	−0.079 (0.088)	−0.121 (0.333)	−0.345 (0.390)	0.717** (0.333)	−0.755** (0.300)	−0.359 (0.377)	−1.096** (0.501)
Founder tenure	0.014 (0.052)	−0.006 (0.018)	0.003 (0.054)	−0.034 (0.072)	0.107 (0.096)	−0.079 (0.080)	−0.199* (0.106)	−0.029 (0.114)
Founder education	0.325 (0.560)	−0.131 (0.135)	0.135 (0.615)	−0.788 (0.643)	0.473 (0.517)	−0.685* (0.377)	−0.102 (0.733)	−0.925 (0.667)
University affiliate	−1.603 (0.996)	0.106 (0.241)	1.650 (1.022)	0.918 (1.354)	−0.538 (1.081)	0.065 (1.173)	0.468 (1.084)	−13.33*** (1.138)
Serial entrepreneur	0.430 (0.525)	−0.104 (0.149)	−0.455 (0.582)	−0.487 (0.644)	−1.028* (0.560)	0.167 (0.444)	1.774** (0.735)	0.311 (0.802)
Same technology	−1.318** (0.622)	0.178 (0.161)	1.663** (0.704)	1.131 (0.699)				
Same industry					−1.348** (0.631)	0.006 (0.415)	2.429*** (0.878)	−0.393 (1.290)
Founded during a recession	0.614 (0.665)	0.196 (0.127)	0.301 (0.742)	1.037 (0.740)	0.604 (0.629)	0.320 (0.482)	−2.067** (1.025)	0.360 (0.760)
Constant	−0.369 (0.855)	0.038 (0.274)	−1.934* (1.116)	0.807 (0.960)	0.003 (1.119)	0.621 (0.828)	−2.615** (1.303)	0.526 (1.455)
Observations	117	117	117	117	117	117	117	117
ll	−53.16	−114.1	−99.32	−99.32	−51.74	−57.01	−60.26	−60.26

(Continues)

TABLE B1 (Continued)

	Spinouts choice of industry				Spinouts choice of technology			
	(1)	(2)	(3)		(4)	(5)	(6)	
Variables	Same industry	Industry distance	New industry (related)	New industry (unrelated)	Same tech.	Tech. distance	New tech. (related)	New tech. (unrelated)
Chi^2	31.93***	28.71***	1547***	1547***	17.91*	27.63***	1721***	1721***
r2_p	0.299	0.093	0.227	0.227	0.181	0.154	0.263	0.263

Note: Other spinouts are the reference category. Robust standard errors in parentheses.
***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.

TABLE B2 Analysis excluding necessity spinouts triggered by M&A.

	Spinouts choice of industry				Spinouts choice of technology			
	(1)	(2)	(3)		(4)	(5)	(6)	
Variables	Same industry	Industry distance	New industry (related)	New industry (unrelated)	Same tech.	Tech. distance	New tech. (related)	New tech. (unrelated)
Opportunity spinouts	−1.210 (0.838)	0.085 (0.226)	2.134** (1.027)	0.593 (0.886)	−0.797 (0.791)	−0.057 (0.579)	1.779* (0.948)	0.153 (0.862)
Necessity spinouts	2.581** (1.107)	−1.829*** (0.692)	−1.114 (1.226)	−16.70*** (0.916)	1.988* (1.090)	−1.961* (1.047)	−1.376 (1.204)	−14.82*** (1.246)
N. founders	0.044 (0.405)	−0.009 (0.077)	−0.047 (0.432)	−0.006 (0.490)	0.768** (0.373)	−0.766** (0.317)	−0.343 (0.477)	−1.102** (0.504)
Founder tenure	0.016 (0.069)	−0.006 (0.018)	0.006 (0.071)	−0.030 (0.090)	0.120 (0.115)	−0.084 (0.087)	−0.260** (0.129)	−0.033 (0.118)
Founder education	0.480 (0.657)	−0.138 (0.128)	−0.021 (0.719)	−0.935 (0.729)	0.731 (0.572)	−0.755** (0.384)	−0.589 (0.833)	−0.992 (0.671)
University affiliate	−0.472 (0.933)	−0.107 (0.212)	0.563 (0.988)	−0.474 (1.423)	−0.699 (1.144)	0.137 (1.222)	0.588 (1.228)	−13.05*** (1.140)
Serial entrepreneur	0.298 (0.573)	−0.104 (0.137)	−0.127 (0.656)	−0.597 (0.656)	−0.988* (0.596)	0.117 (0.465)	1.756** (0.835)	0.327 (0.811)
Same technology	−1.250* (0.692)	0.139 (0.165)	1.635** (0.762)	0.996 (0.774)				
Same industry					−1.317* (0.699)	−0.060 (0.456)	2.489*** (0.947)	−0.367 (1.298)
Founded during a recession	−0.180 (0.636)	0.160 (0.121)	−0.345 (0.724)	0.859 (0.760)	0.548 (0.655)	0.353 (0.487)	−1.940* (1.004)	0.354 (0.769)
Constant	−0.306 (0.891)	−0.012 (0.258)	−1.952* (1.154)	0.595 (1.009)	−0.310 (1.185)	0.709 (0.822)	−2.033 (1.392)	0.587 (1.458)
Observations	92	92	92	92	92	92	92	92
ll	−39.16	−94.87	−79.55	−79.55	−45.23	−53.49	−53.98	−53.98
Chi^2	24.05***	18.14**	1311***	1311***	13.72	19.48**	1212***	1212***
r2_p	0.258	0.070	0.204	0.204	0.160	0.117	0.241	0.241

Note: Other spinouts are the reference category. Robust standard errors in parentheses.
***$p < 0.01$. **$p < 0.05$. *$p < 0.1$.