

Prior partnering experience and preferred alliance partner diversity of small firms

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Abstract

Purpose – This study investigates how small firms develop preferences for varying levels of alliance partner diversity by applying a behavioral perspective.

Design/methodology/approach – Data were collected via an original survey administered by the Swedish National Bureau of Statistics (SCB) of 1,026 Swedish firms with 50 employees or less. Hypotheses were tested by specifying a series of fractional response regressions.

Findings – The results show a *U*-shaped relationship between experienced and preferred alliance partner diversity in small firms and further show moderating effects of firm age, prior growth and environmental dynamism. The findings suggest that preferences towards diverse alliance portfolios in small firms may arise, not only from well-informed deliberate strategic thinking based on prior experience, but also as a consequence of cognitive bias.

Practical implications – The findings suggest that (1) small firms considering a wide variety of alliance partners should carefully investigate whether they are, in fact, capable of mastering a highly diverse alliance portfolio or if they are overconfident novices. (2) Holders of homogenous alliance portfolios should recurrently investigate whether homogeneity is due to informed strategy or inertia.

Originality/value – This study contributes to the literature on alliance partner diversity and behavioral alliance portfolio configuration by shedding light on the learning mechanisms that shape alliance portfolio strategies of small firms by explicating the complexity of how different experience levels of partner variety affect current alliance portfolio preferences.

Keywords Alliance portfolio, Experience, Preferences, Small firms

Paper type Research paper

1. Introduction

The shift towards a knowledge based economy has accelerated the growth of alliance formation and created a need for firms to engage with multiple alliance partners, simultaneously (Contractor and Lorange, 2002; Wassmer, 2010). Such alliance portfolios hold great potential, but also pose great challenges for small firms (Baum *et al.*, 2000; Lavie, 2007; Parida *et al.*, 2016). Firms need to carefully configure their alliance portfolios for effectiveness and efficiency by ensuring that value is added through complementary and supplementary resources, while the costs related to governance complexity and redundancy are avoided (Baum *et al.*, 2000; Brouthers *et al.*, 1995; Dussauge *et al.*, 2000; Jiang *et al.*, 2010). This need for a “balancing act” has given rise to a stream of research concerned with alliance partner diversity (APD), i.e. the degree to which firms’ alliance portfolios are configured to contain partners that are heterogeneous in terms of resources and capabilities, as well as the governance implications of such configurations (De Leeuw *et al.*, 2014; Duysters *et al.*, 2012; Hagedoorn *et al.*, 2018).

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While numerous studies have examined the performance implications of APD for innovation (Hagedoorn *et al.*, 2018; Van Beers and Zand, 2014), growth (Baum *et al.*, 2000; Parida *et al.*, 2016) and financial performance (Jiang *et al.*, 2010), finding, on aggregate, positive effects (Lee *et al.*, 2017), there are still significant gaps in our understanding on how diversity in alliance portfolio configurations emerge and evolve (Asgari *et al.*, 2017; Hagedoorn *et al.*, 2018; Kavusan and Frankort, 2019; Wassmer, 2010), especially in small firms. Studies on, chiefly, large firms have concluded that firms learn to manage APD with experience, because it prompts and aids the development of necessary capabilities to reduce coordination costs and deal with complexity (Anand and Khanna, 2000; Duysters *et al.*, 2012; Van Beers and Zand, 2014). This would suggest that, with more experience, firms will prefer more diverse alliance portfolios. Alliance experience, however, is acknowledged to be a multifaceted concept which might have varying effects depending on its depth, breadth and a multitude of other factors (Duysters *et al.*, 2012; Fern *et al.*, 2012a; March *et al.*, 1991; Rothaermel and Deeds, 2006). Few studies have focused upon small firms (for two notable exceptions see: Prabhudesai *et al.*, 2022; Vicentin *et al.*, 2021), where the “dark sides” of experience may be more pronounced due to biased behaviors, e.g. lack of adaptability to new information and overgeneralizing from limited experience (Fern *et al.*, 2012b; March *et al.*, 1991; Parker, 2006; Shepherd *et al.*, 2015). To the best of the authors’ knowledge, no study has investigated the mechanisms that translate the experience of APD to APD preferences of managers in small firms. Addressing this gap will extend our understanding of the alliance portfolio configuration process in small firms, particularly its early phases of partner consideration.

Against this background, this study empirically examines the effects of prior partner variety (i.e. APD experience) – defined in line with Hagedoorn *et al.* (2018) as the “number of different partner types (i.e. customers, suppliers, competitors, universities and research institutes) with whom a focal firm collaborates” (p. 810) – on the configuration of a hypothetical alliance portfolio based on choices of the most preferred partner types for product development (new and incremental), commercialization, market expansion and cost reduction. We further examine the moderating effects of the contextual factors: prior growth, age and perceived environmental dynamism, to capture how different levels of uncertainty faced by the firm affect learning from previous partnering experiences. Thus, the study specifically aims to answer two interrelated questions: (1) how APD experience affects current APD preferences of small firms; and (2) how the relationship between APD experience and APD preference is affected by conditions that set different levels of uncertainty: prior growth, environmental dynamism and firm age. The data used to investigate these questions were gathered through an original survey distributed to CEOs of 5,000 Swedish small and medium sized firms, resulting in a final dataset of 1,026 small firms.

Our study makes three contributions to the literatures on alliance partner diversity and behavioral perspectives on alliance portfolio reconfiguration. The first, and primary, contribution lies in shedding additional light on the learning mechanisms that shape alliance portfolio reconfiguration preferences of small firms by explicating the complexity of how different experience levels of APD affect current alliance portfolio preferences. We hypothesize and test a *U-shaped* relationship between the experience of APD and APD preferences. The second contribution consists of identifying uncertainty inducing firm factors as moderators of how experience translates into partner type preferences. The third contribution emerges from adding a much-needed small firm perspective (Aldrich and Ruef, 2018) to the APD and alliance portfolio reconfiguration literature (Lee *et al.*, 2017). By adopting a small firm, behavioral lens, we provide additional insights into how cognitive mechanisms as well as resource and legitimacy challenges are especially relevant to alliance portfolio considerations of small firms.

In the following sections, we introduce the research model and continue to develop and test the main hypothesis for an APD preference development curve influenced by the cognitive limitations and learning idiosyncrasies of small firms, as well as three moderating hypotheses on the influence of uncertainty factors on the experience-to-preference relationship.

2. Theoretical background

As a means to access and combine resources controlled by other organizations, alliance portfolios allow firms to explore and exploit opportunities that otherwise lie beyond their reach (Baum *et al.*, 2000; Lee *et al.*, 2017). Whilst having multiple alliance partners can provide access to more unique resources and capabilities, it also adds complexity and governance costs (Baum *et al.*, 2000; Gulati and Singh, 1998; Jiang *et al.*, 2010; Van Beers and Zand, 2014). On the one hand, having access to a diverse range of partners providing complementary resources can increase the efficiency of the portfolio by avoiding redundancy and conflict among partners. On the other hand, a diverse set of partners will make it more difficult to streamline and make efficient portfolio management processes. In the context of alliance portfolio configuration, diversity is, thus, both a potential source of added value as well as a source of costly complexity (Kavusan and Frankort, 2019; Parkhe, 1991; Singh and Mitchell, 1996). In anticipation of such added costs, firms with more internal resources consequently have a clear advantage in configuring alliance portfolios (Prabhudesai *et al.*, 2022). While small firms *can* gain competitive advantage through multiple, simultaneous alliances, the combinations and roles of different partners in the portfolio is an especially important determinant of whether the overall effect on performance is positive or negative (Baum *et al.*, 2000; De Leeuw *et al.*, 2014; Lee *et al.*, 2017). With limited resources to deal with such costs, it is especially important for these firms to configure alliance portfolios in a fashion that is diverse enough to provide sufficient complementarity, while at the same time avoiding redundancy and competition between alliance partners (Baum *et al.*, 2000).

In pursuit of these goals, alliance portfolio configuration is often implicitly described as a conscious, unboundedly rational process involving the objective evaluation of potential partners' capabilities, commitment and compatibility (Kale and Singh, 2009). Firms are believed to choose alliance partners based on the value that would be the outcome of synergistic combinations of complementary and supplementary resources, with careful considerations of costs and benefits (Das and Teng, 2000; Hitt *et al.*, 2000; Madhok and Tallman, 1998).

Counter to the arguments that alliance portfolio configurations are the result of careful evaluation and perfectly rational decision-making, nevertheless, stands the high failure rate of alliances (Madhok and Tallman, 1998; Parkhe, 1991) and studies that show detrimental effects of repeated alliances with prior partners (Goerzen, 2007). Evaluating to what extent a prospective alliance partner, or bundle of partners, would provide the benefits that a firm seeks to gain from its portfolio is more accurately described as a cognitive process heavily influenced by experiences and environmental stimuli (Ozcan and Eisenhardt, 2009).

For smaller and younger firms, e.g. start-ups and scale-ups, there are especially convincing reasons to question alliance formation processes as perfectly rational. First, liabilities of smallness and newness infer limitations to the resource and relationship pool available to small and young firms (Stinchcombe, 1965). These firms consequently experience higher partner search costs (Dekker and van den Abbeele, 2010) and make partnering decisions on less informed grounds and under less favorable conditions (Haeussler *et al.*, 2012). These limitations have important implications for the configuration of alliance portfolios.

Second, although definitions vary greatly [1], small firms, start-ups and scale-ups are all often characterized by relatively informal organization structures and processes, with

decision-making power largely centralized in the hands of an entrepreneur manager (Miller and Friesen, 1984). This has important implications for partner selection and alliance portfolio configuration processes as entrepreneurs and small firm managers have been found to rely more on heuristics and to be more prone to biases than managers of larger, established firms (Artinger and Powell, 2016; Busenitz and Barney, 1997). Cohen *et al.* (2018) for example, observed that entrepreneurs tended to prematurely satisfice in decision-making, that they overemphasized the relevance of their own experiences and tended to dismiss advice that conflicted with their own beliefs. Information inaccuracies, satisficing behavior and biases such as overconfidence, over optimism and overgeneralizations affect the decision-making of entrepreneurs, leading to increased risk-taking and potentially costly errors (Palich and Ray Bagby, 1995; Simon and Shrader, 2012). In the context of alliance partner evaluation and portfolio configuration, these mechanisms can lead to preferences that would not be expected from the arguably more rational behavior of large firms.

Preferences are important precursors to the choices an individual makes, be it in choosing the color of a car (Lancaster, 1966) or which political candidate to vote for (Druckman and Lupia, 2000). In explaining utility functions, consumer and voter behaviors, the role of preferences has received well due attention, however, in the literature on alliance portfolio reconfiguration, its role is much less explicit. Attempts at understanding a firm's alliance preferences are often done by analyzing partnering choices made in the past. This may, nonetheless, be misleading, as more than just preferences play into final outcomes of decision-making processes, important too are facets such as the availability of options and the focal firm's ability to form ties with its ideal partners. Entrepreneurs will often have to settle for less preferable courses of action owing to the lack of resources and network connections. Decisions made can, therefore, give an indication of preferences but cannot account for them in their entirety. Investigating preferences as a precursor of partner selection can hence provide deeper a understanding of alliance portfolio reconfiguration processes.

Preferences for different goods, as well as different courses of action are formed based on the properties of the alternatives (Lancaster, 1966; Von Wright, 1963). In the scenario of adding an additional partner type to the portfolio, extant alliance literature would suggest that such properties include the resources and the capabilities of the prospective partner, as well as degree of commitment and compatibility (Kale and Singh, 2009; Shah and Swaminathan, 2008). Depending upon the goal and situation at hand, an entrepreneur or small firm manager may prefer one type of partner for one task while another might be deemed more suitable for another. Preferences have also been described as a matter of evaluating an alternative state of affairs, i.e. to understand the basis of a preference for A over B, it is necessary to understand what expected consequences of A are preferable to B (von Wright, 1972). In the scenario of alliance portfolio reconfiguration, we may then think of the added perceived opportunities and capabilities made available, as well as costs incurred by a certain alliance portfolio build, as different state affairs, for which managers will develop different preferences.

2.1 Hypothesis development

The rationale behind this study is to investigate how small firms move from experience of alliance partner diversity (or lack thereof) to APD preferences by applying a behavioral and small firm alliance portfolio reconfiguration perspective. As a processes of learning, preference formation is heavily influenced by perceptions of the context that is being navigated (Simon, 1979, 1996; von Wright, 1972), we shall also propose how the uncertainty facing the small firm manager (arising from the firm's age and growth trajectory) as well as the perceived dynamism in the environment, moderate this learning curve.

Another factor that ought to be considered is that small firm managers with limited experience of collaborating with a variety of partner types also run the risk of overestimating the firm's ability to manage and reap the rewards from a diverse set of partners. Overconfidence has been found to have significant influence on decision-making in small firms (Simon and Shrader, 2012) and has been linked to higher estimations of international performance (Musso *et al.*, 2022), as well as a tendency to venture into novel contexts (Navis and Volkan Ozbek, 2016). Somewhat paradoxically, optimism and overconfidence is more pronounced in the absence of experience (Busenitz and Barney, 1997; Kruger and Dunning, 1999; Palich and Ray Bagby, 1995; Simon and Shrader, 2012). Entrepreneurs and managers of small firms with limited experience of collaborating with diverse partner types could, thus, face an increased likelihood that a decision is influenced by overconfidence and optimism, rather than careful, objective deliberation and at the same time increases their tendency to seek out new, unexplored partnering possibilities. It may, therefore, be expected that small firms with limited experience of partner variety will show stronger preferences for APD.

Investigating how firms develop preferences for certain partner types and alliance strategies, rather than in hindsight analyzing what choices have been made in the past, is rarely done in partner selection research. This constitutes an important missing piece of the puzzle in how firms make partnering choices and how alliance portfolio configurations emerge.

Figure 1 visualizes the research model underlying our inquiry into the phenomenon. First, we expect the relationship between prior experience and APD preference to show a U-type relationship. Second, we consider the effect of three factors—firm age, growth stage and perceived environmental dynamism – on the relationship between prior and preferred APD. Below, we unpack the constructs and inter-linkages in our model and develop hypotheses for empirical testing.

2.1.1 Main effect: prior and preferred APD. Alliance experience has been argued to be a key determinant for APD (Duysters *et al.*, 2012; Van Beers and Zand, 2014) and firms with diverse alliance portfolios are assumed to develop strong coordination capabilities to manage the increasing complexities that they are forced to deal with (Lavie and Miller, 2008). It has, hence, been suggested that more experience implies higher capabilities and thus predicts more diverse alliance portfolios (Van Beers and Zand, 2014). Alternatively, firms have also been found to be more likely to choose the same or similar partners with whom they have previous alliance experience (Gulati, 1995; Uzzi, 1997), and Hoffmann (2007) suggests a general tendency for firms that lack experience to start out with more explorative strategies for alliance portfolio configuration and then steadily move towards more exploitative builds. This implies two opposing forces influencing the relationship between APD experience and APD preferences.

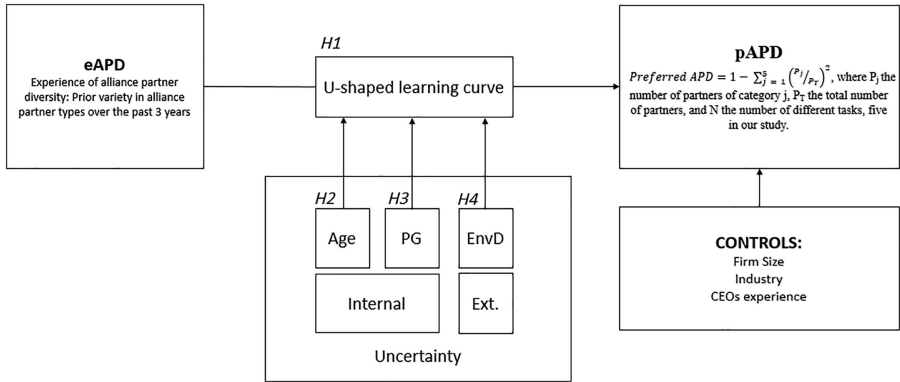


Figure 1.
Research model

Minniti and Bygrave (2001) suggest categorizing entrepreneurial decisions into two possible strategies: sticking close to what they know and have done in the past or venturing into unknown territory by taking actions that can be considered new to the firm. For many small firms, especially start-ups and young firms, it may be so that all of the options on the table are new to the firm, as little to no history exists. In the absence of experience, the factors that remain to guide the formation of preferences largely originate in the nature of the problem faced and heuristic assumptions regarding which resources different partners may have to offer, e.g. suppliers being efficient at manufacturing, universities excelling at R&D. A lack of hands-on experience is, therefore, likely to lead to an explorative approach (Hoffmann, 2007) based on preconceived ideas of what capabilities are needed for a given task, as well as what capabilities different partner types possess.

Another factor to consider for inexperienced firms is that small firm managers with limited experience of collaborating with a variety of partner types also run the risk of overestimating the firm's ability to manage and reap the rewards from a diverse set of partners. Overconfidence has been found to have significant influence on decision-making in small firms (Simon and Shrader, 2012) and has been linked to higher estimations of international performance (Musso *et al.*, 2022), as well as a tendency to venture into novel contexts (Navis and Volkan Ozbek, 2016). Somewhat paradoxically, optimism and overconfidence is more pronounced in the absence of experience (Busenitz and Barney, 1997; Kruger and Dunning, 1999; Palich and Ray Bagby, 1995; Simon and Shrader, 2012). Entrepreneurs and managers of small firms with limited experience of collaborating with diverse partner types could, thus, face an increased likelihood that a decision is influenced by overconfidence and optimism, rather than careful, objective deliberation and at the same time increase their tendency to seek out new, unexplored partnering possibilities. It may, hence, be expected that small firms with little, to no, experience of partner variety will show stronger preferences for APD.

For another category of small firms that begin to gain experience of a few different partner types, learning begins with how to best develop and balance their alliance portfolio in the future. March *et al.* (1991) suggest that learning processes are generally conservative, however, that both success and failure “contains the seeds of change”. As has been discussed previously in this paper, despite APDs potentially positive effects on performance (Lee *et al.*, 2017), there is wide agreement that diversity in alliance portfolios also infer costs (Baum *et al.*, 2000; Hagedoorn *et al.*, 2018; Parida *et al.*, 2016). With higher diversity of alliance partners, portfolios become increasingly complex to manage, leading to sharp increases in management and coordination costs (Bruyaka and Durand, 2012; Sarkar *et al.*, 2009). This realization, as small firms expand their experience of partner diversity, will likely force them to focus their limited resources on partner types that are cheaper to find as well as to manage (Goerzen and Beamish, 2005; Lee *et al.*, 2017). Faced then, with alliance partner choices, these firms would be more prone to sticking to a narrower set of partner types that they have had positive experiences with, in the past. As a consequence, we argue that, as increasing costs of complexity and search become salient for firms with growing experience of working with a variety of partner types, preferred APD will be lower at medium levels of experience. This is also in line with ideas that learning from exploiting known strategies happens faster due to the certainty, clarity and speed of feedback. The inherent characteristics of the adaptive process of exploitative learning, e.g. quick and clear feedback, tend to lure resource constrained firms more toward exploitative learning (March, 1991). This effect is likely to be magnified in the context of small firms due to liabilities of smallness as well as cognition mechanisms relevant to entrepreneurial settings.

Experience, however, tends to build both skill and eventually confidence (Kruger and Dunning, 1999) and “success leads to a sense of competence and willingness to experiment” (March *et al.*, 1991). If a firm gains sufficient experience from partnering with a variety of

different partner types, i.e. its scope of prior partnering experience is wide, the firm's decision makers will likely be able to more accurately assess each partner type's potential for contribution to different collaboration objectives and be more confident in their capabilities to handle a more complex portfolio, thereby resulting in higher preferred APD (Duysters *et al.*, 2012).

In summary, through a combination of bounded rationality and experiential learning mechanisms, the preferred APD is expected to have a *U*-shaped relationship with experienced APD. Based on the perspectives discussed above, we expect that small firms with limited partner variety experience will express preferences towards high alliance partner diversity as a result of cognitive biases seen in entrepreneurial decision-making (Shepherd *et al.*, 2015). However, as experience grows, and issues of costs and complexity of diversity becomes salient, preferred APD is expected to be low for medium levels of partner variety experience. Eventually, small firms that manage to build enough experience of diverse partner types will be more skilled and accurately confident in their ability to manage and reap benefits from diverse alliance portfolio configurations. We thus formulate our main effect hypothesis as follows:

- H1. The scope of prior partnering experience of the firm exhibits a curvilinear (*U*-shaped) relationship to the alliance partner diversity preference of a small firm.

2.1.2 Moderating hypotheses. An important motivation for firms to develop alliance portfolios is to cope with uncertainty (Hoffmann, 2007). Under conditions of high uncertainty, the need for fast learning increases substantially. This often forces small firms to engage in ad hoc experimentation limited in scope and time, from which conclusions must be efficiently drawn on how to proceed. Such conditions have been shown to amplify the prevalence of cognitive mechanisms, i.e. heuristics and biases in entrepreneurial settings, with potentially both positive and negative results (Shepherd *et al.*, 2015). Uncertainty arising from both internal and external factors has been suggested to affect partnering strategies, but findings remain inconclusive (Beckman *et al.*, 2004). This study introduces age and prior growth as factors generating internal firm-specific uncertainty, influencing the development of small firms' partnering preferences. Age is introduced as a moderating variable based on arguments that young firms face greater uncertainty as they lack the knowledge of their market as well as established routines and relationships (Bruderl and Schussler, 1990; Stinchcombe, 1965). As firms age, their structures and processes become more predictable and the variance in performance becomes lower (Hannan and Freeman, 1984; Singh *et al.*, 1986), indicating that older firms will face less uncertainty in decision-making.

Growth is hypothesized to be a moderating variable due to the firm-specific uncertainty different growth trajectories infer. First, both poor and superior performances tend to trigger change in the decision-making behavior of firms (Wennberg *et al.*, 2016). Given that uncertainty is defined as "the difficulty firms have in predicting the future, which comes from incomplete knowledge" (Beckman *et al.*, 2004), firms that either grow very rapidly or are on the decline, are forced to react to new circumstances and have less time to acquire knowledge to understand their situations. They, therefore, stand to face greater uncertainty than do firms on more moderate growth paths.

Perceived external uncertainty is accounted for in this study by the introduction of environmental dynamism as a moderator on the experience-to-preference relationship. A highly dynamic business environment infers greater potential variance in the market equation variables, making predictions notably difficult (Daft *et al.*, 1988; Duncan, 1972). High perceived uncertainty may lead to decision makers to simplify the process by focusing attention to a few major factors of which they have some knowledge (Downey *et al.*, 1975).

We expect the *U*-shaped relationship between experience of and preferences for APD to be contingent upon a set of firm-specific and perceived environmental factors tied to uncertainty. Uncertainty can be defined as "... the difficulty firms have in predicting the

future, which comes from incomplete knowledge” (Beckman *et al.*, 2004). The concept of uncertainty has been closely linked to alliance formation and is suggested to be a driving force of both exploration (Kogut, 1991; Pfeffer and Salancik, 1978; Powell *et al.*, 1996) and exploitation (Gulati, 1995) strategies in alliance portfolios. Whether firms choose to make explorative choices, i.e. reach out to new partner types, or exploitative choices, i.e. reinforce ties with existing partner types, may, therefore, depend upon the type of uncertainty faced by firms.

Firm-specific uncertainty will differ significantly depending on which stage of development a firm is in. First, firm age is expected to affect the relationship, making the *U*-shape effect more pronounced for young firms. It is during the first few years of a firm’s life that it is particularly vulnerable and prone to failure (Bruderl and Schussler, 1990). Due to liabilities of newness, young firms are faced with extraordinarily uncertainties as they strive to gain a foothold in their industry (Stinchcombe, 1965). Lack of established relationships and legitimacy in the eyes of potential partners infer a need for young firms for explorative search for alliance partners (Hoffmann, 2007). At the same time, overconfidence and optimism is more pronounced under the high uncertainty of young start-up firms. Furthermore, under conditions of uncertainty, decisions are made with limited possibilities for calculating outcomes and consequences. Thus, we formulate the second hypothesis:

H2. Firm age positively moderates the relationship between prior partnering experience and the diversity of partner type preferences.

Second, a firm’s prior growth is expected to affect the relationship in such a way that firms that have experienced high growth as well as firms that are declining should exhibit a more pronounced *U*-shaped relationship compared to firms with little to moderate growth. Firms’ ability to accurately predict decision outcomes is hampered under conditions of internal changes to resource configurations, which can be triggered by both poor and superior performance (Wennberg *et al.*, 2016). Firms that grow very rapidly or are struggling to survive face great uncertainty as they are forced to react to new circumstances and have less time to acquire knowledge to understand their situations (Churchill and Lewis, 1983). These firms are, hence, likely to be exposed to greater uncertainty than are firms that are growing at a more moderate and steadier pace:

H3. Prior growth positively moderates the relationship between prior partnering experience and the diversity of partner type preferences.

Finally, the degree of perceived dynamism in the firm environment is likely to increase the risk of cognitive bias playing a part in shaping partner preferences due to the high uncertainty facing firms in such environments. It has been found that top managers’ perception of environmental uncertainty facing the firm, more so than actual circumstances has an impact on decision-making (Huber and Daft, 1987) such that firms are then more likely to make quick decisions based on limited information. The proposed *U*-shaped relationship between experience and preferences can, thus, be expected to become more pronounced under such conditions. With little experience of APD, small firms are less aware of the additional costs of a diverse alliance portfolio and may then form their preferences based more upon the potential benefits they perceive in an urgent search for a viable path forward (Churchill and Lewis, 1983). On the other hand, with some experience of APD, costs become the most salient aspect of experience and will in turn weigh disproportionately heavy in a high dynamism environment, where the need to rely on heuristics and limited information to make quick decisions is greater (Khatri and Ng, 2000; Lumpkin and Dess, 2001). Hence, we propose the following hypothesis:

H4. Environmental dynamism positively moderates the relationship between prior partnering experience and the diversity of partner type preferences.

In the following section we will discuss the method of data collection and analysis used to test the proposed relationships, as well as the operationalization of theoretical constructs. Further, control variables and the arguments for their inclusion are introduced.

3. Methods

3.1 Sample

The data for this study was collected via an original survey administered by the Swedish National Bureau of Statistics (SCB) of 5,000 Swedish firms stratified by region, firm size and industry affiliation and complemented with the register-based data on firm's financial indicators, age and industry affiliation. To account for the situation that the bulk of firms and universities are clustered in the Southern and Western parts of Sweden, a sample of 2,500 firms was drawn from regions that are classified as sparsely populated according to the EU Nomenclature of Territorial Units for Statistics division (Norrbotten, Västerbotten, Västernorrland, Jämtland, Gävleborg, Dalarna and Värmland), and another sample of 2,500 firms was taken from the Southern and Western parts.

Two reminders were sent out to participants, and after which, a total of 1,532 responses were obtained, resulting in a 30.64% response rate which varied between 32.69% and 29.36% examined by size class and localization. Thus, we have no grounds to suspect that non-response bias was a concern. As we are only interested in small firms that fit into start-up/scale-up continuum in terms of employee size, we use a subset consisting of 1,026 firms with number of employees ranging between 10 and 50 and no missing values.

Firms were included within the following industries, as defined according to the Swedish Standard Industrial Classification 2007, (percentages indicate proportion within responding firms): agriculture, forestry and fishing (2.3%); mining and quarrying (0.7%); manufacturing (31.5%); electricity, gas, steam and air conditioning supply (1.3%); water supply, sewerage, waste management and remediation activities (1.2%); construction (15.7%); transportation and storage (8.7%); accommodation and food service activities (5.8%); information and communication (5.8%); professional, scientific and technical activities (9.9%); administrative and support service activities (6.7%); human health and social work activities (6.7%); real estate activities (3.8%).

3.2 Dependent variable

We follow the approach of [Van Beers and Zand \(2014\)](#) in measuring preferred APDs. CEOs of the responding firms were prompted to select their firm's best potential partner for each one of the following five situations: (1) development of completely new goods or services, (2) commercialization of new goods or services, (3) expansion to new markets, (4) improvements to existing goods or services and (5) cost reductions. The firm could select from seven partners: suppliers, customers, firms within own industry, firms from other industries, consultants, universities and other organizations.

[Table 1](#) provides a descriptive summary of the most preferred partner types for each of the five tasks. Not surprisingly, there is a clear dominance of customers and suppliers as most preferred partners. Regardless of task, they are preferred by most firms. When it comes to developing new and improved products and services, commercialization and market expansion, customers are the most preferred partner type consistently chosen over 40% of the time. If the goal of partnering is to reduce production costs, suppliers are the most popular option, getting picked 53.2% of the time, but they are also considered valuable as partners in the context of improving and commercializing new products and services (20%). Firms within their own industry are the second most preferred choice when it comes to expansion to new markets and are chosen by around 15% of the firms for all tasks. Although the other partner types: universities, consultants and "other" are more rarely preferred, some firms still consider them the optimal choice for certain tasks.

	Development of completely new goods or services	Commercialization of new goods or services	Expansion to new markets	Improvements to existing goods or services	Cost reductions
<i>Partner type</i>					
Suppliers	23.32	18.54	10.08	26.95	53.20
Customers	45.87	47.34	50.30	45.51	10.84
Firms within own industry	15.83	16.17	17.56	13.13	15.37
Firms from other industries	4.89	5.82	8.48	2.57	3.55
Consultants	3.65	7.59	6.79	6.22	10.15
Universities	3.74	1.28	1.40	3.16	3.25
Other organizations	2.69	3.25	5.39	2.47	3.65

Table 1.
Partner type
preferences:
percentage of
respondents preferring
particular type given a
particular task

The partner type list is comparable to the one used in community innovation surveys, a set of standardized and harmonized questionnaires distributed biannually in OECD member states. We measure the diversity of preferences using 1-“Herfindahl index” as the most commonly used measure of diversity and allows for the use of binary variables (Barron and Vanyushyn, 2021;

Patil and Taillie, 1982; Van Beers and Zand, 2014): $Preferred\ APD = 1 - \sum_{j=1}^5 \left(P_j / P_T \right)^2$, where P_j

the number of partners of category j , P_T the total number of partners and N the number of different tasks, five in our study. High values of preferred APD show that different partners are chosen for different tasks. Correspondingly, low values indicate that a firm relies on just one or very few partners (min = 0, max = 1, $m = 0.484$). In other words, a firm for which *Preferred APD* is 0 will choose only one partner for each possible task, showing no diversity at all. On the other hand, a firm with *Preferred APD* of 1 will choose a different partner type for each possible task with no overlaps, showing maximum diversity in its preferences.

3.3 Independent variables and moderators

We follow Hagedoorn *et al.* (2018) and approach *prior experience* as a variety based measure, operationalized as the sum of different partners (suppliers, customers, firms within own industry, firms from other industries, consultants, universities and other organizations) a firm collaborated with during the 3 year period prior to the survey year (min = 0, max = 7, $m = 4.57$); we standardize the variable as it is included in interaction terms.

As firms are often defined as startups during their first 5–6 years in existence (Baum *et al.*, 2000), we place firms in three categories based on their age: young firms are maximum 5 years old, *mature* firms are between 6 and 16 years old, and *old* firms are older than 16 years. We capture prior growth as three years annualized growth rate in number of employees prior to the survey year and develop three growth categories: (1) *high growth* firms represent top quartile of growth distribution, with growth of 11% and up, (2) *moderate growth* firms with growth rate above 0 and below 11% and (3) *declining firms* with growth rate below 0%. Finally, we measure perceived *environmental dynamism* using a formative 6-item scale adapted from (Verhoef and Leeflang, 2009, p. 40) that captures the perceived rate of changes in customer preferences, production, or service technologies and modes of competition in the firm’s principal industries.

3.4 Control variables

We control for the effects of the firm’s *industry affiliation*, represented by the degree of knowledge intensity of a firm’s sector (high technology, medium-high technology, medium-low technology, low technology, high technology services, knowledge-intensive services and less knowledge-intensive services) and *firm size* measured as number of employees (min = 10, max = 50, $m = 18$). Finally, entrepreneurs and CEOs may bring with them experiences from their prior places of employment. To account for this effect, we included variables that capture CEO’s managerial experiences at the current firm, expressed in years and top-management experience in other firms, also expressed in years.

Table 2 summarizes the descriptive statistics pairwise correlations between the dependent and independent variables; with categorical variables for firm age and size represented as dummies.

4. Results

As our dependent variable *Preferred APD* is bound by 0 (no diversity in preferences) and 1 (maximum diversity) inclusive, it has the properties of fractional dependent variable defined to be bounded between zero and one. Hence, to test our hypotheses, we specify and estimate four fractional logistic regressions each corresponding to one of the four hypotheses. Fractional regression is the best-practice technique for fractional outcomes (Villadsen and Wulff, 2021) and overcomes the limitations of most commonly used and popular approaches such as linear regressions or the Tobit model – which we also report in the robustness checks section.

Table 3 reports the estimation results, and Figure 2 plots the predictive margins at varying levels of prior experience and moderating variables for each of the models. All models are significant overall at $p < 0.00$. Given that we model both the curvilinear main effect and moderating effects using multiplicative interactions, we standardize continuous variables that are included in the interaction terms (Jaccard and Turrisi, 2003).

First, we test the main effect hypothesis (H1) that postulates the U-shaped relationship between prior experience and preferred APD. Model 1 in Table 3 reports the estimation result and yields support to the hypothesis 1 as both the linear and quadratic terms of prior experience are positive and significant (PriorExp = 0.188, $p < 0.01$, PriorExp $\times$ PriorExp = 0.132, $p < 0.05$).

Table 2.
Descriptives and
correlations

	Mean	SD	1	2	3	4	5	6	7	8
1 Preferred APD	0.48	0.215	1							
2 Firm size	18.98	10.91	−0.02	1						
3 Prior experience	4.66	1.62	0.01	0.09	1					
4 Environmental dynamism	9.46	3.09	0.07	0.11	0.31	1				
5 Executive experience in current firm (years)	10.51	8.95	0.02	−0.12	−0.11	−0.02	1			
6 Executive experience in other firms (years)	7.26	8.88	−0.02	0.02	0.04	0.07	−0.18	1		
7 Age_group	0.60	0.70	−0.02	−0.07	0.04	0.03	−0.30	0.08	1	
8 Growth_group	0.88	0.78	−0.09	0.16	0.07	0.07	−0.08	−0.06	0.23	1

	Model 1	Model 2	Model 3	Model 4
Old	()	()	()	()
Mature	-0.101 (0.135)	-0.101 (0.062) 0.252** (0.092)	-0.083 (0.082) 0.157* (0.116)	() (0.061) -0.110* (0.091) 0.138 ()
Declining	()	()	()	()
Moderate growth	-0.080 (0.062)	-0.084 (0.062)	0.152* (0.062)	-0.074 (0.079)
High growth	-0.241** (0.073)	-0.239** (0.073)	-0.189* (0.073)	-0.241** (0.073)
Low tech	()	()	()	()
Medium-low tech	-0.204** (0.102)	-0.218** (0.102)	-0.223** (0.102)	-0.207** (0.102)
Medium tech	-0.006 (0.131)	0.001 (0.131)	-0.016 (0.129)	-0.025 (0.131)
High tech	0.122 (0.166)	0.094 (0.166)	0.100 (0.166)	0.096 (0.167)
Service low tech	-0.012 (0.094)	-0.017 (0.094)	-0.015 (0.095)	-0.005 (0.093)
Service high tech	-0.127 (0.097)	-0.140 (0.097)	-0.134 (0.097)	-0.137 (0.096)
Unclassified	-0.178* (0.095)	-0.183* (0.095)	-0.197** (0.096)	-0.162* (0.096)
Firm size	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	0.001 (0.002)
Executive experience in current firm (years)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.002 (0.004)
Executive experience in other firms (years)	-0.005 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)
PriorExp	0.188** (0.031)	0.207** (0.031)	0.182** (0.039)	0.157** (0.034)
PriorExp × PriorExp	0.132** (0.029)	0.147** (0.029)	0.231** (0.037)	0.147** (0.039)
Old × PriorExp	()	()	()	()
Mature × PriorExp	()	0.052 (0.066)	()	()
Young × PriorExp	()	-0.305** (0.104)	()	()
Old × PriorExp × PriorExp	()	()	()	()
Mature × PriorExp × PriorExp	()	0.002 (0.064)	()	()
Young × PriorExp × PriorExp	()	-0.128 (0.089)	()	()
Declining × PriorExp	()	()	()	()
Moderate growth × PriorExp	()	()	0.061 (0.067)	()
High growth × PriorExp	()	()	-0.048 (0.078)	()
Declining × PriorExp × PriorExp	()	()	()	()
Moderate growth × PriorExp × PriorExp	()	()	-0.277** (0.064)	()
High growth × PriorExp × PriorExp	()	()	-0.045 (0.065)	()
Environmental dynamism	()	()	()	()
PriorExp × Environmental dynamism	()	()	()	()
PriorExp × PriorExp × Environmental dynamism	()	()	()	()
Constant	0.010 (0.113)	0.007 (0.116)	-0.097 (0.114)	-0.004 (0.038)
Observations	1,026	1,026	1,026	1,026

Note(s): Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, () – reference category

Table 3.
Effects of prior
experience of preferred
APD: fractional
regression results

Figure 2(a) plots the conditional mean of preferred APD vs. prior experience and reveals a clear *U*-shape pattern within the confidence interval. Hence, the main effect hypothesis H1 is confirmed.

The subsequent hypotheses H2, H3 and H4 suggest that this relationship will be moderated by firm age, prior growth and perceived environmental dynamism. Hence, models two through four include additional interaction effects with the moderating variables in addition to the baseline relationship reported in the Model 1.

Results of the Model 2 suggest that firm age does moderate the relationship, in particular the coefficient for the interaction *Young* $\times$ *PriorExp* is negative and significant (-0.305 , $p < 0.01$). While the result does suggest that firm age indeed moderates the focal relationship, the results are somewhat contrary to expectations. In particular, the interaction plot reported in Figure 2(b) shows that young firms exhibit a nearly linear relationship between prior experience and preferred APD diversity and overall have a higher diversity in partner preferences compared to old and mature firms.

In line with Hypothesis 3 expectations, firms that exhibited either negative or high prior growth exhibit *U*-type relationship, while average growth firms show nearly a linear and steadily increasing relationship between experience and prior diversity. The results of are reported in Model 3. In particular, the coefficient for the term *ModerateGrowth* $\times$ *PriorExp* $\times$ *PriorExp* is negative (-0.066 , $p < 0.05$) and “flattens” the curve for firms that exhibited moderate growth, an effect illustrated in Figure 2(c). As such, Hypothesis 3 is confirmed and firm age indeed moderates the relationship in an expected way.

Finally, and in line with expectations, *U*-shape pattern is clearly pronounced in highly dynamic environments, yielding support to Hypothesis 4. The results for Model 4 show that the coefficient for the term *PriorExp* $\times$ *PriorExp* $\times$ *EnvironmentalDynamism* is positive and significant (0.060 , $p < 0.5$), suggesting that in environments that are perceived as more dynamic, the curvature of the *U*-shape is more pronounced. The effect is plotted in Figure 2(d).

Naturally, we conducted several robustness checks to assess the stability of our findings. First, we checked whether the model is sensitive to the specification by running an OLS regression, a commonly used even if not best-practice technique (Villadsen and Wulff, 2021) given the fractional nature of our dependent variable. The significance levels of the independent and moderating variables did not change substantially, and insignificant coefficients did not become significant. The OLS regression results are reported in Table 4; all controls are included but not reported in the interest of brevity, same for the conditional means plots. Second, we used alternative measures of independent variables, e.g. log-transforming continuous variables. No substantive changes in the results occurred and all the focal coefficients retained their direction and significance. Overall, the observed effects retain the direction and significance in alternative specifications.

5. Discussion

This study has investigated the long withstanding question of how firms' alliance portfolio configuration preferences develop as a result of accumulated experience (Kavusan and Frankort, 2019; Wassmer, 2010). While rational partner selection criteria for alliance portfolio reconfiguration are quite well understood, and a positive influence of learning on alliance portfolio management may be assumed, predictions of actual selection outcomes show inconsistent results, implying influence of bounded rational and even irrational behaviors, of actors (Kavusan and Frankort, 2019; Li *et al.*, 2008; Li and Rowley, 2002; Reuer and Lahiri, 2014). Bounded rationality and cognitive biases are especially important issues in small firm and entrepreneurial learning contexts where they have been shown to affect entry and exit as well as opportunity evaluation and capture decisions (Baron, 1998; Musso *et al.*, 2022; Shepherd *et al.*, 2015). Given that alliance portfolio reconfiguration decisions are of high importance for the growth of small firms (Baum *et al.*, 2000; Kavusan and Frankort, 2019;

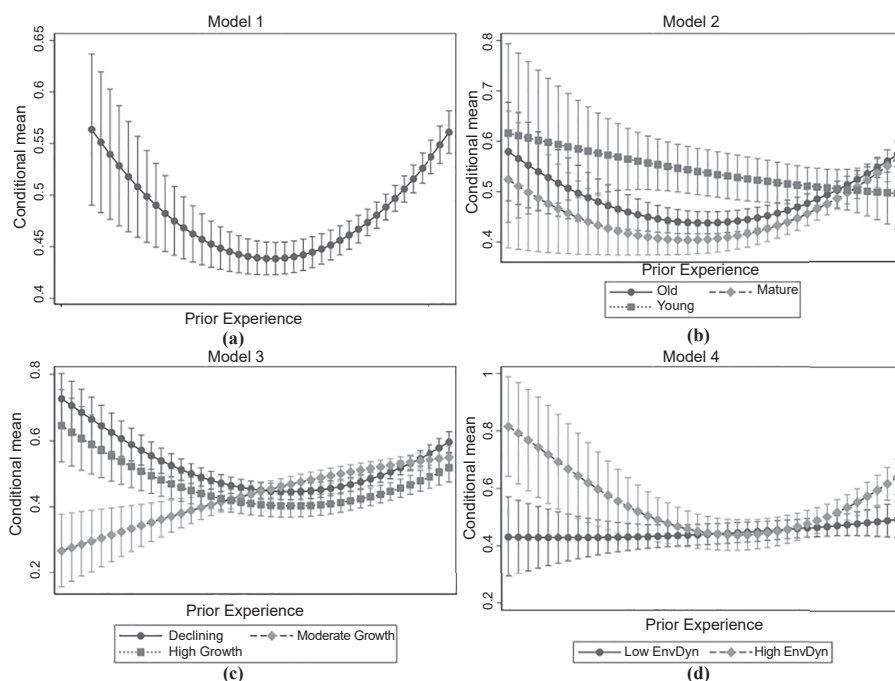


Figure 2.
Effects of prior
experience on preferred
alliance partner
diversity: predictive
margins with 90%
confidence intervals

Parida *et al.*, 2016), it is surprising that relatively limited attention has been given to entrepreneurship and small firm-specific aspects of such decisions.

5.1 Theoretical contribution

Our results indicate that the relationship between prior partnering experience and current diversity preferences is more complex than has hitherto been argued and especially so for firms exposed to higher levels of uncertainty. The outcome of the main hypothesis test shows that small firms form their APD preferences based on their APD experience, but that the relationship is not linear positive as might be expected based on prior studies (Van Beers and Zand, 2014). We find support for a *U-shaped* relationship between degree of diversity in prior alliance portfolio configurations and preferred alliance partner diversity in small firms. Entrepreneurs exhibit higher levels of optimistic overconfidence and tend to overgeneralize based on limited information to a larger extent than managers of large firms (Shepherd *et al.*, 2015). This, we propose, leads to the rather counterintuitive finding that limited experience of APD is associated with preferences for high APD. Only as the breadth of a firm's experience of collaborating with different partner types expands, uncertainty regarding collaboration with known partners is reduced and the costs of managing APD becomes increasingly salient. Faced then, with alliance partner choices, these entrepreneurs would be more prone to sticking to the type of partners with which they have a positive track record. In line with learning logic, as small firms gain more alliance experience with wider range of partners, they eventually learn to "master the art" of APD and return to preferences for high APD. We thus suggest that the relationship between alliance experience and future alliance decisions thus becomes very complex considering the different biases exhibited by entrepreneurs as well as the high uncertainty involved in predicting decision outcomes.

Table 4.
Robustness checks:
OLS specification

	Model 1	Model 2	Model 3	Model 4
PriorExp	0.046**	0.207**	0.182**	0.157**
PriorExp × PriorExp	0.033**	0.147**	0.231**	0.147**
Old × PriorExp		()	(0.039)	(0.045)
Mature × PriorExp		0.013	()	(0.039)
Young × PriorExp		−0.076**	(0.018)	
Old × PriorExp × PriorExp		()	(0.026)	
Mature × PriorExp × PriorExp		0.000	()	
Young × PriorExp × PriorExp		−0.032*	(0.013)	
Declining × PriorExp			()	
Moderate growth × PriorExp			0.015	()
High growth × PriorExp			−0.012	(0.018)
Declining × PriorExp × PriorExp			()	(0.020)
Moderate growth × PriorExp × PriorExp			−0.066**	()
High growth × PriorExp × PriorExp			−0.010	(0.013)
§				(0.016)
Environmental dynamism				−0.001
PriorExp × Environmental dynamism				0.007
PriorExp × PriorExp × Environmental dynamism				0.014**
Observations	1,026	1,026	1,026	1,026
Note(s): Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, () – reference category. Full model estimation, only hypothesized results reported				

This study, consequently, contributes by explaining how these predictions stemming from opposing forces, one emphasizing the increase in capability to deal with APD, and the other, the learning advantage of exploiting known options, may be reconciled in the context of small firms.

We further examined the moderating effects of firm age (H2), prior growth (H3) and environmental dynamism (H4). The results provide support for the latter two, for which the high uncertainty positively moderates the relationship. Surprisingly, young firms did not behave as expected, instead exhibiting a nearly flat relationship between experience and preferred APD, visualized in Figure 2(b). March *et al.* (1991) provides one possible explanation arguing that learning from experience is not only outcome based but also takes into account early collateral aspects of experience. Advantages of newness due to less rigidity (Autio *et al.*, 2014) could possibly be part of this explanation as well, as young firms may be in a more explorative search mode and strive to avoid core rigidities and competency traps (Rosenkopf and Nerkar, 2001) while as firms age, they become less willing to take risks as long as performance is satisfactory (Wennberg *et al.*, 2016).

While preferences for known partners has been explained by organizational learning and reduced informational uncertainty when dealing with past partners (Dekker and van den Abbeele, 2010; Gulati and Gargiulo, 1999), to the best of the authors' knowledge, no studies explicated the nonlinear relationship between experience and alliance partner diversity in the context of small firms. Hence, our study contributes to the literature on alliance partner diversity and behavioral perspectives on alliance portfolio configuration.

5.2 Limitations

This study is not without limitations. Similar to other studies on APD (De Leeuw *et al.*, 2014), the focus in this study was on alliance partner types, not taking into account all dimensions of APD, such as governance and national diversity which have different effects on performance (Jiang *et al.*, 2010). It may very well be that inclusion of other elements of diversity in alliance portfolios will affect the observed relationships. The cross-sectional nature of the data used in this study also limits the potential of the study to fully ascertain the causal mechanisms behind the observed relationships. While we have applied several techniques and arguments to strengthen the case for causality, this limitation cannot be fully overcome. We also do not model the collective decision-making of management teams in this study, a process that might affect all the stages of portfolio configuration and preference formation.

5.3 Implications for research and practice

Undoubtedly, future work will remedy the limitations discussed above. Considering the non-linear relationship shown in the study, future studies could investigate a wider range of relevant APD dimensions and how they relate to small firm learning from alliance experience in search of similar relationships. Doing so would fill important remaining gaps in our understanding of these processes. Also, in line with the ongoing microfoundations debate (Barney and Felin, 2013), it would be valuable to look at, especially through qualitative inquiry, how former experiences and skills of individual CEOs and top-management teams affect which partner types, or other diversity indicators, are considered for different tasks in new organizations.

Finally, our findings can offer some practical words of caution to entrepreneurs thinking about the make-up of their alliance portfolios. Small firm decision makers that have, or are considering, a highly diverse portfolio of alliance partners, would do well to pause and ponder whether they are in fact capable of being “masters” of APD, or are they rather overconfident novices. Equally it is important for the holders of homogenous alliance portfolios to think carefully about whether this strategy is overly cautious going forward or if it is objectively in

line with the firm's current capabilities. Inertia in regard to alliance portfolio development poses a significant threat to small firms over time, because an overly homogenous portfolio limits a firm's ability to capture and create valuable opportunities and too keep up with an ever changing market (March, 1991). On the other hand, the runaway costs of diverse portfolios, for which there are limited capabilities to manage and reap benefits from, can put severe economic strain on a small firm. By raising self-awareness of the relationship between experience and preferences that has been explicated here, this study aims to provide some support for entrepreneurs to make more rational portfolio configuration decisions.

Notes

1. There are no universally accepted definitions of these concepts. For start-ups, age is the only ubiquitous characteristic; however, the cut-off point varies greatly. We follow Baum *et al.*'s (Baum *et al.*, 2000) definition of start-ups as firms 5 years or younger and adopt as scale-up definition the OECD (Organisation for Economic Co-operation and Development and Statistical Office of the European Communities, 2007) definition of young high-growth firms or "gazelles" as firms 5 years or younger that have a 20% annualized growth rate over the past 3 years.

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