Int Entrep Manag J (2016) 12:1147–1164
DOI 10.1007/s11365-016-0387-6

# Exploration and exploitation and firm performance variability: a study of ambidexterity in entrepreneurial firms

**Vinit Parida**[1,2] · **Tom Lahti**[3] · **Joakim Wincent**[1,3]

Published online: 24 February 2016


**Abstract** A challenge young entrepreneurial firms usually face is reducing variability in firm performance in order to mitigate survival difficulties. This paper suggests ventures should have a clear preference for either exploration or exploitation, because such an approach to ambidexterity reduces variability in firm performance. We specifically concentrate on the moderation effects of firm size and environmental dynamism in a sample of young entrepreneurial firms. We found evidence for the effects of lower performance variability in dynamic environments. This is an important insight, because environmental dynamism is a contingency where performance variance is considered problematic for entrepreneurial firms. Our research has implications for the establishment phase of entrepreneurial firms as it suggests they should carefully consider how much they explore to be as different as possible and how much they exploit to be as effective as possible. This is particularly important when they are younger and exposed to dynamic environments.

**Keywords** Exploration · Exploitation · Ambidexterity · Performance variance · Entrepreneurship

✉ Vinit Parida
vinit.parida@ltu.se

Tom Lahti
tom.lahti@hanken.fi

Joakim Wincent
joakim.wincet@ltu.se

[1] Entrepreneurship and Innovation, Luleå University of Technology, 971 87 Luleå, Sweden

[2] Department of Management, University of Vaasa, P.O Box 700 Vaasa, Finland

[3] Entrepreneurship and Management, Hanken School of Economics, PB 479, 00100 Helsinki, Finland

## Introduction

The traditional challenge facing entrepreneurial firms suggests that strategy in the establishment phase is based on exploring new ways to do business and establish business operations to survive the liability of newness (Rosenbusch et al. 2011). In the present study, we focus on young entrepreneurial firms (less than 50 employees and younger than 10 years) that are considered to have great potential to develop innovations for commercial applications (Mas-Tur and Soriano 2014). As entrepreneurial firms attempt to establish themselves in the market, generating value through exploration may be insufficient, because they consequently need to exploit alternatives to be more efficient than potential rival firms and competitors (Terziovski 2010). As such, entrepreneurial firms have been discussed as operating under conditions in which they need to be reactive, flexible, and still resource effective (McGrath 1999).

Empirical research has recognized the tension between the need to explore to be different and the need to exploit to be more effective; indeed, reflecting on the findings provides contradictory prescriptions. On the one hand, managing concomitant choices between exploitation and exploration are suggested as central to enhancing performance (March 1991). March (1991) called for considering both exploration and exploitation, because overreliance on exploitation could limit adaptation, increase threat-rigidity and resource lock-ins, and compromise long-term survival. Similarly, as returns from exploration are uncertain, overreliance on exploration could erode a firm's limited resource base and reduce performance. On the other hand, although such argumentation is evident, past studies exploring the relationship between ambidexterity (or the simultaneous pursuit of exploration and exploitation)[1] and performance have found support for positive (e.g. Gibson and Birkinshaw 2004; He and Wong 2004; Lubatkin et al. 2006), negative (e.g. Atuahene-Gima 2005), curvilinear (e.g. Rothaermel and Alexandre 2009; Uotila et al. 2009), or no effects (e.g. Cao et al. 2009). Thus, "the empirical evidence of the organizational ambidexterity-performance relationship remains limited and mixed" (Raisch and Birkinshaw 2008: 393).

The purpose of the present paper is to examine how levels of ambidexterity influence performance by focusing on entrepreneurial firms. In doing so our approach takes a different perspective compared to previous research. First, for entrepreneurial firms, we suggest *balancing* the pursuit of exploration and exploitation—not scoring as high as possible in both—as something that is of central importance. *Combinatory* and *balancing* ambidexterity are two separate dimensions of the concept of organizational ambidexterity (Cao et al. 2009). The *combinatory* dimension measures the combined magnitude of exploration and exploitation, whereas the *balancing* dimension measures the relative difference between exploration and exploitation. Although large, established firms can commit substantial resources to both activities (Cao et al. 2009; Junni et al. 2013), we suggest that entrepreneurial firms should not strive to explore and exploit as much as possible because of the liability of newness. We focus on the *balancing* dimension and suggest that entrepreneurial companies should balance either exploring or exploiting to use resources effectively so that they can combine the needs to explore and to differentiate to that of exploiting to increase efficiency.

[1] Unless stated otherwise, for brevity, we refer to ambidexterity as balance in exploration and exploitation.

Second, we anticipate that liabilities arising from not pursuing ambidexterity and thus being inclined to either explore or exploit are greater for entrepreneurial firms in dynamic environments. Third, due to high failure rates of entrepreneurial firms, we acknowledge that focusing on stability and survival is commonly a more important priority than growth and profitability (e.g. Preisendörfer and Voss 1990; Santarelli and Vivarelli 2007). Indeed, stability of performance is an important signal to acquire resources (Hughes 1986; Titman and Trueman 1986) and gain legitimacy (Oliver 1997). We reason that entrepreneurial firms with higher reliability (or lower variability) in performance are more likely to survive. Investors demand lower temporal variability in performance from small firms (cf. Hansen and Singleton 1983).

Against this background, we develop a theory to suggest a need for ventures to pursue either long-term adaptation through exploration or short-term performance through exploitation. This suggests that entrepreneurial firms could rely on an either-or-strategy to ambidexterity in order to reduce variability in performance and increase survival.

Overall, the present study contributes to previous research in several ways. Because ambidexterity has typically been studied in the context of large, often multi-unit firms, to date there is scant research of ambidexterity in young entrepreneurial firms. There have been some studies that have investigated ambidexterity within SMEs (Lubatkin et al. 2006, Fernhaber and Patel 2012; Patel et al. 2013; Voss and Voss 2013; Abebe and Angriawan 2014; Kim and Huh 2015a, b), but only two studies that have a similar early stage focus as the present study (Frigotto et al. 2014; Volery et al. 2015). The present study enhances the literature's understanding of the role of ambidexterity in young entrepreneurial firms, because it targets firms that are less than 10 years old with less than 50 employees.

Although plenty of studies have investigated the influence of ambidexterity on short-term firm performance (e.g. He and Wong 2004; Jansen et al. 2006; Lubatkin et al. 2006; Yang and Li 2011), sparse research exists on the effect of ambidexterity on firm survival. Furthermore, the existing studies do not concentrate on young entrepreneurial firms (see Piao 2010; Hill and Birkinshaw 2014; Kim and Huh 2015a, b). We contribute by examining the effect of ambidexterity on stability of firm returns and suggest that less variance in the returns improves a firm's chances for survival. Given that our results support the relationship and demonstrate links to survival, young entrepreneurial firms should be encouraged to strike a balance between exploration and exploitation.

The present study challenges previous research that suggests that firm size is negatively associated with its ability to achieve profitability through ambidexterity (Ebben and Johnson 2005; Voss and Voss 2013) by anticipating that it is, in fact, the smaller firms that benefit the most from ambidexterity in terms of its impact on return stability. Hence, the variance-reducing effect of ambidexterity in entrepreneurial firms is assumed to be greater when the firms are smaller in size. When it comes to achieving ambidexterity, an advantage that these firms have in relation to larger ones is that they are more agile. This helps them approach exploitation through efficient customer support and exploration through employing a creative, dynamic approach for innovating new products faster than the competition (Schreuders and Legesse 2012).

Although studies examining performance effects of ambidexterity have used environmental dynamism as a control variable (e.g. Mom et al. 2009; Rothaermel and

Alexandre 2009), and some studies have investigated the direct relationship between environmental dynamism and ambidexterity (e.g. Revilla et al. 2010), only a few studies have examined environmental dynamism as a moderator (Jansen et al. 2005; Raisch and Hotz 2010; Kim and Huh 2015b). The current study adds to this research by examining whether the variance-reducing effect of ambidexterity in young entrepreneurial firms is moderated by the level of environmental dynamism. We expect that it is vital in terms of performance stability and survival that firms either pursue exploration or exploitation in industries with higher environmental dynamism, because exploration helps encounter the rapid obsolescence of products and services, whereas exploitation ensures efficiency and a steady stream of revenue (Jansen et al. 2005; Simsek 2009).

The remainder of this paper is organized as follows. Next, we present prior research on the topic of ambidexterity and young entrepreneurial firms, ambidexterity and performance reliability, and the moderating effect of firm size and environmental dynamism. More specifically, we present three hypotheses for empirical testing. In the third section, the methods employed in this research are described, including operationalizing constructs and data analysis. We subsequently present the results before we discuss them, and offer limitations and suggestions for future studies in the final section.

## Literature reiview

### Previous research on ambidexterity in the entrepreneurial firm context

Large, multi-unit firms often pursue structural ambidexterity. It implies that they create a structurally separate business, some focusing entirely on exploitation and others entirely on exploration (Lubatkin et al. 2006; Simsek 2009). Young firms, however, lack the resources to create such dual structures (Azadegan et al. 2012; Parida et al. 2012). Instead of using structural ambidexterity, they may rely on contextual ambidexterity, which is the behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit or firm (Gibson and Birkinshaw 2004). In order to demonstrate alignment, the pattern of activities needs to be coherent and directed toward the same goal, whereas adaptability requires the capacity to quickly reconfigure activities to meet challenges in the task environment (Gibson and Birkinshaw 2004). Some arguments have suggested that pursuing exploitation and exploration harmoniously is challenging, because each competes for scarce resources, which may lead to conflicts within the organization (Simsek et al. 2009).

Research on SMEs has indicated that the top management team has an important role in managing levels of exploration or exploitation (Lubatkin et al. 2006; Patel et al. 2013; Volery et al. 2015; Parida and Örtqvist 2015). Top management in SMEs, as opposed to their counterparts in large organizations, often participates in implementing a firm's strategies day-by-day. This means that they are not only closer to a firm's competences and hence more knowledgeable of when and how to exploit them, but also closer to the market and therefore well-positioned to be aware of changing market trends to discover new opportunities (Lubatkin et al. 2006; Wales et al. 2013). Lubatkin et al. (2006) indicated that by promoting collaboration and the high-quality exchange of information, top management's behavioral integration creates trust and reciprocity.

Also, it is important for them to establish systems and processes that promote ambidexterity in the workforce (Gibson and Birkinshaw 2004). Patel et al. (2013) demonstrated that high-performance work systems in SMEs can achieve this by generating a context characterized by discipline, stretch, support, and trust. As such, they encouraged employees to focus their energies on both exploration and exploitation activities concurrently. This helps a firm achieve high growth rates.

As such, it has been suggested that ambidextrous firms need personnel with both entrepreneurial and managerial traits (see Dover and Dierk 2010), because entrepreneurs typically focus on identifying market opportunities, forge effective teams, and undertake other venturing activities. In contrast, a manger's task is to ensure that efficiency is maintained in operations. In these firms it becomes important for an individual employee to learn to perform many different roles and activities to support ambidexterity, as they often do not have the financial resources hire new employees. Their leadership challenges are also pronounced as entrepreneurs must learn the business and the job of leading it on a trial and error basis (Frigotto et al. 2014).

Although the discussion of balance is evident in the literature, it is typical for young entrepreneurial firms to strongly pursue exploration at the expense of exploitation (e.g. Ebben and Johnson 2005; Terziovski 2010; Frigotto et al. 2014), albeit research discussed they may benefit from carrying out their activities in an ambidextrous fashion from the firm's startup. Kollmann et al. (2009) highlighted that building ambidextrous structures and mindsets at the very early stages will enhance firm sustainability. They added that entrepreneurs are usually advised to make the transfer from their chaotic beginnings into a managed firm as quickly as possible. Although far from straightforward, such studies indicate that exploration and exploitation are simultaneously achievable in young entrepreneurial firms (Bot 2012, Schreuders and Legesse 2012; Volery et al. 2015). However, to what extent behavioral limitations such as resource constraints actually allow entrepreneurs to accomplish exploratory and exploitive activities needs further attention, because they may advice conclusions in another direction. Previous research has not offered and tested a theory perspective about how to balance and act on pursuits of exploration and exploitation. We develop the above proposition in the context of entrepreneurial firms. Young entrepreneurial organizations lack resources, stable integration at the market, and are highly susceptible to external shocks (Hannan and Freeman 1984).

## Ambidexterity and performance reliability in entrepreneurial firms

Managing entrepreneurial ventures is much about strategic actions that addresses the relations among strategic similarity, competition, legitimacy, and performance (see Deephouse's 1999 theory about managing strategic balance). This view of strategic consideration adopts the view that a firm's strategic position relative to that of competing firms should influence performance. It draws on two contrasting views of how a firm should position itself in relation to competing firms. These views stem from strategic management and institutional theory. According to the former view, a new young firm should differ from its competitors to achieve competitive advantages (e.g. Porter 1980; Wernerfelt 1984; Barney 1991). A differentiation strategy is seen as benefiting a firm, because it will face less competition for resources and increased performance. Successful firms create niches and erect, in terms of industry organization

(IO) economics, entry and mobility barriers (Porter 1981; Deephouse 1999). Underlying their strategic position, in accordance with the resource-based view (RBV), are resources that are valuable, rare, imperfectly imitable, and non-substitutable (Barney 1991).

According to the latter view, new young firms imitate successful strategies to achieve high performance. In accordance with the process of isomorphism a range of normal strategies become legitimate (DiMaggio and Powell 1983). When a firm's strategy is legitimated it is acceptable to, for example, potential exchange partners, such as customers, suppliers, and regulators (Deephouse 1999).

To this background, and while acknowledging lack resources, absence of integration at the market, and that new young firms are highly susceptible to external shocks (Hannan and Freeman 1984) we posit that ambidexterity in entrepreneurial firms in terms of pursuing either exploration or exploitation leads to greater reliability (lower variance) in performance. Our arguments are consistent with previous research that has found that small firms face difficulties in while executing both and that their performance suffers as a result (Van Looy et al. 2005; Ebben and Johnson 2005; Voss and Voss 2013). Overall, we suggest that if young entrepreneurial firms lack the resources, capabilities, and experience to manage the conflicting demands of exploration and exploitation, they may end up being at most average at both, which put them into jeopardy (Kuckertz et al. 2010; Voss and Voss 2013). As such, we acknowledge that exploration is resource-consuming in entrepreneurial firms to maintain continuity and avoid learning traps and helps maintain "stability, safety, and robustness, usually in the face of persistent perturbations" (Farjoun 2010: 207). Exploration helps improvise responses to limit destabilization (Farjoun 2010; Perrow 1999). Exploration allows entrepreneurial firms to adapt decisions, rules, and actions to establish procedural rationality to assure stakeholders and investors of the fruition of future exchanges and increases trustworthiness, which are central to the conditions they face in the establishment process (Hannan and Carroll 1995).

However, due to limited resources and capabilities and cognitive capabilities (Lounamaa and March 1987), entrepreneurial firms may not be able to leverage fully exploration without a risk for less reliability in performance. That said, exploration allows for increased stability and reliability by helping devise alternate strategic and tactical responses (LaPorte and Consolini 1991; Sitkin and Pablo 1992), and expand the strategic response repertoire (Landau and Chisholm 1995). Exploration increases mindfulness through greater openness to new information, improved anticipation and exploration, and lower complacency.

Compared with established firms, young entrepreneurial firms have fewer resources to cushion against exploration risks (Cao et al. 2009; Parida et al. 2012). A firm's excessive focus on exploration, therefore, might result in underdeveloped new ideas that are replaced before they contribute to a firm's revenue stream (Levinthal and March 1993; Junni et al. 2013). This may jeopardize the sustainability of a business as the returns from new ideas are typically long-term and very difficult to predict (Raisch and Birkinshaw 2008). Instead, exploitation provides a steady resource supply to engage in exploration, because it requires an entrepreneurial firm to quickly develop formal structures to squeeze costs and effectively meet the customers' needs (Terziovski 2010).

Past work indicates that stability is a precursor to flexibility and change (Bateson 1972), that bureaucracies are necessary to develop flexibility (Adler et al. 1999; Briscoe 2007), and organizational limits could be liberating (Dewey 1922). Controls and formalization from exploitation reduce variation. As such, an alternative is control systems and disciplined processes to guide the innovation process (Cusumano 1991) and to eliminate inefficiencies in all parts of an organization through continuous improvement (e.g. Miller and Friesen 1982). In pursuing exploration, therefore, exploitation mitigates building blocks to "greatly reduce the need for trial and error, thereby economizing on cognition" (Farjoun 2010: 2012). It also limits resource accumulation necessary to undertake riskier exploration initiatives. Simultaneous exploitation increases deviation and mismatch, which results from exploration efforts to systematize the innovation process under limited resources (March 2006). Overall, for entrepreneurial firms, we posit that either pursuing exploration or exploitation and thus an either/or strategy, increases reliability in performance. Formally,

> *Hypothesis 1.* Managing ambidexterity in entrepreneurial firms in terms of pursuing either exploration or exploitation leads to greater reliability (lower variance) in performance.

## Decreasing firm size

Our next set of arguments indicates that smaller firms that manage ambidexterity through pursuing either exploration or exploitation have a higher likelihood of survival (Piao 2010; Hill and Birkinshaw 2014; Kim and Huh 2015a, b). The earlier studies concentrate on more established firms that have already survived the liabilities of newness. We indicate that in contrast to their larger and more mature counterparts, small firms that seek to achieve performance reliability are better off choosing the flexible or efficiency route than mixing the two (Ebben and Johnson 2005). The need for reliability increases as firm size decreases. The smaller the entrepreneurial firm, the greater the need to maintain stability (Wiklund et al. 2010) and the less forgiving the excessive focus on both pursuing exploration or exploitation (Lubatkin et al. 2006; Cao et al. 2009). For smaller entrepreneurial firms, the demands from task and institutional environments become increasingly onerous on their fledgling resource base (Shepherd et al. 2000; Choi and Shepherd 2005). The need for pursuing either/or exploration or exploitation becomes increasingly central to stabilizing the firm, but also increasing adaptation in the face of uncertainty. The dual signals of adaptation and stability are increasingly required to engage stakeholders from the task environment (Choi and Shepherd 2005; Wiklund et al. 2010).

Moreover, in these firms, power distances are smaller than in larger ones (Hechavarria and Reynolds 2009), which makes it is difficult for entrepreneurs to create an environment characterized by security to invest substantial resources to pursue exploration and exploitation concurrently, while managing the conflicting demands of the competing activities. In such an environment, it becomes potentially costly for entrepreneurs to implement ambidextrous activities such as, for example, setting up regular team meetings to discuss exploration and exploitation related

issues and encouraging team members to build and maintain networks outside the firm that can be used for exploitation and exploration purposes (see Volery et al. 2015). Overall:

> *Hypothesis 2.* The variance-reducing effect of pursuing either exploration or exploitation in balancing ambidexterity in entrepreneurial firms will be greater when firms are smaller in size.

## Environmental dynamism

Environmental dynamism refers to the rate of change or unpredictability in the environment (Dess and Beard 1984). Dynamic environments are characterized by rapid shifts in technological capabilities, new entry, and demand uncertainty. When an environment is stable, in contrast to dynamic, the likelihood is higher that a firm can obtain a precise understanding of its critical variables, predict changes, and adapt to them (Simsek 2009).

In dynamic environments, the ability to launch new products rapidly and cannibalize older products are pivotal to success. Exploration is important in such environments because firms need to be strategically flexible, as customer needs and competitor activities may demand immediate action (Simsek 2009). A dynamic environment needs to be studied carefully (Miller and Friesen 1983), because it may quickly render current products and services obsolete and hence require new ones to be developed (Jansen et al. 2006; Raisch and Hotz 2010).

In such environments, exploitation is also useful as harvesting existing opportunities and providing incremental improvements to existing products or services could lead to higher returns, or, in some cases, avoiding failure (e.g. Jansen et al. 2005, 2006; Raisch and Hotz 2010; Kim and Huh 2015b). However, entrepreneurial firms focusing on exploration could lock their limited investments in to broad efforts that are difficult to coordinate without uncertain returns. Although the ability to synchronize exploitation and exploration provides investments in resources for the next round of explorative efforts, entrepreneurial firms are under greater pressure to recoup R&D and product development costs from exploration. Due to the erosion of new knowledge generated in dynamic environments, "under some conditions the appropriate response to environmental change is a renewed focus on exploiting existing knowledge and opportunities" (Posen and Levinthal 2012: 587). As such, it can be argued that for entrepreneurial firms, rather than swinging for the fences in dynamic environments, increasing reliability in performance while either investing in exploration or exploration could be more important for ensuring survival.

Our foregoing arguments stand in stark contrast to earlier studies on more mature firms, which indicate that the use of ambidexterity positively influences performance in particular when firms operate in dynamic environments (Jansen et al. 2005, Simsek 2009, Kim and Huh 2015b). We suggest that for young entrepreneurial firms, simultaneously pursuing exploration and exploitation in terms of ambidexterity leads to reduced performance stability in such environments. We reason that because implementing ambidexterity is often very challenging for these firms, their managerial challenges might be exacerbated when they encounter dynamic environments that are

characterized by rapid shifts in technological capabilities, new entry, and demand uncertainty. Overall:

> *Hypothesis 3.* The variance-reducing effect of either pursuing exploration or exploitation in managing ambidexterity in entrepreneurial firms will be higher in industries with higher environmental dynamism.

## Method

We used a two-wave survey and archival performance measures to test the proposed model. The two-wave survey measured exploration and exploitation in 2007 and 2009 and ensured measurement of stability in ambidexterity efforts over time. We drew on *Affarsdata*, a directory of firms in Sweden, to identify financial performance measures of ventures from 2004 to 2007 (to control for past performance) and from 2007 to 2012 (to predict variability in performance). To secure sampling of entrepreneurial firms, the sampling frame in *Wave 1* started with identifying approximately 4000 high technology firms listed in *Affarsdata* in 2007, each with fewer than 50 employees and younger than 10 years. To manage survey costs in the initial sampling frame assuming a statistical power of 0.8 at 1 % sampling error, firm-sized effects and a 10 % response rate, 1500 firms were required.

Next, the survey with exploration and exploitation scales and other measures were pilot tested with eight CEOs. A cover letter and a survey were mailed to CEOs in mid-2007. Out of 1500 potential respondents, 83 surveys were returned due to wrong addresses, 74 responses were incomplete, 11 respondents were from the same company and 52 ventures declined to participate. The remaining 314 responses (26.16 % response rate) did not differ from nonrespondents based on firm number of employees ($t$–test =0.872), firm age ($t$–test =0.534), and sales ($t$–test =1.073).

For *Wave 2*, 314 ventures were contacted again in March 2009. A cover letter and survey with exploration and exploitation measures and additional scales were mailed to the CEOs. The 213 responding firms with complete scale items, for a retention rate of 67.83 %, did not differ from firms that did not respond in *Wave 2* based on the number of employees ($t$–test =0.325), firm age ($t$–test =0.207), and sales ($t$–test =0.522).

To control for past performance and collect information on financial performance, we matched 213 firms responding in both waves with their financial information between 2004 and 2012 in *Affarsdata*. In Sweden, regardless of age or firm size, firms are required to file financial statements certified by a chartered accountant. We were unable to match 26 firms. Thus, the final sample consisted of 187 firms responding with completed scale items in both waves and complete financial information from 2004 to 2012.

**Independent variables** Exploration and exploitation are measured using a scale from He and Wong (2004). In line with exploration and exploitation as stable firm strategies (Raisch and Birkinshaw 2008), ambidexterity, as proposed by Cao et al. (2009), is the absolute difference between exploration and exploitation. The balance measure of ambidexterity is pertinent to small firms, which must allocate limited resources between exploration and exploitation.

**Moderator variables** *Firm size* was measured as the natural logarithm of firm assets reported in *Affarsdata. Environmental dynamism* was measured by using five-year rolling windows during the period of observation. For each year t, in the first regression, natural log of sales from t–5 to t were regressed on time from t–5 to t, and in the second regression, the natural log of operating income from t–5 to t was regressed on time. The mean of anti-log of the standard errors of each regression is the measure of environmental dynamism (Keats and Hitt 1988).

**Controls** To control for past performance, we used the log of mean *sales* between 2004 and 2006. Next, using Google patents, we counted the *number of patents* in each year between 2007 and 2012. We controlled for *operating cash flow*, sum of net income, depreciation, and change in working capital (or changes in liabilities, inventories, and accounts receivables), because these could impact firm-level actions that could, in turn, increase variability in sales based on *Affarsdata*. *Firm age*, a proxy for liabilities of newness, was measured as years since establishment as reported in *Affarsdata*.

**Dependent variable** We took the standard deviation of sales as the measure of variability in sales during 2004 to 2012.

## Results

Table 1 lists the mean, standard deviation, and bivariate correlations. The OLS results are presented in Table 2. Hypothesis 1, which proposed that managing ambidexterity in entrepreneurial firms in terms of pursuing either exploration or exploitation leads to lower variance in performance (Model 2: $\beta = -0.071$, $p < 0.10$), was marginally supported. Next, Hypothesis 2, which suggested that the variance-reducing effect of pursuing either exploration or exploitation in entrepreneurial firms will be greater when they are smaller in firm size (Model 3: $\beta = 0.0274$, $p > 0.10$) was not supported. Hypothesis 3, which proposed the variance-reducing effect of either pursuing exploration or exploitation in managing ambidexterity in entrepreneurial firms will be higher in industries with higher environmental dynamism (Model 4: $\beta = -0.235$, $p < 0.05$) was clearly supported. As presented in Fig. 1, with increasing balance variability increases.

## Discussion and conclusion

The present study enhances the literature's understanding of the role and performance effects of ambidexterity in the context of young entrepreneurial firms. To date, there are have been some studies that have investigated ambidexterity within SMEs (Lubatkin et al. 2006; Fernhaber and Patel 2012; Patel et al. 2013; Voss and Voss 2013; Abebe and Angriawan 2014; Kim and Huh 2015a; b), but only two studies that have a similar early stage focus as the current study (Frigotto et al. 2014, Volery et al. 2015).

The results demonstrate that young entrepreneurial firms that focus on either exploration or exploitation achieve higher return stability. In accordance with Ebben and Johnson (2005), the present study's results indicate that young entrepreneurial firms are better off choosing the flexibility route or efficiency route than mixing the

**Table 1** Mean, standard deviation and pearson correlation matrix

| | | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Standard Deviation of Sales | 1.0066 | 0.3071 | 1 | | | | | | | | | |
| 2 | Past Sales | 38.4626 | 28.4369 | 0.0078 | 1 | | | | | | | | |
| 3 | Number of patents | 1.8984 | 1.3933 | 0.0155 | 0.2278[a] | 1 | | | | | | | |
| 4 | Operating cash flow | 5.1180 | 2.4870 | −0.0491 | 0.0288 | 0.0598 | 1 | | | | | | |
| 5 | Firm age | 6.9320 | 1.4019 | −0.1047 | 0.0228 | −0.0308 | 0.2615[a] | 1 | | | | | |
| 6 | Exploration | 3.0145 | 0.9213 | −0.0124 | −0.0161 | 0.0087 | −0.0054 | 0.055 | 1 | | | | |
| 7 | Exploitation | 2.0445 | 0.8063 | 0.0424 | −0.1259 | −0.0499 | −0.1669[a] | 0.0995 | 0.7579[a] | 1 | | | |
| 8 | Mean Exploration and Exploitation | 2.5295 | 0.8101 | 0.014 | −0.0718 | −0.0199 | −0.0861 | 0.0808 | 0.9458[a] | 0.9287[a] | 1 | | |
| 9 | \|Exploration – Exploitation\| | 0.9925 | 0.5731 | −0.0859 | 0.134 | 0.0959 | 0.1933[a] | −0.0777 | 0.4818[a] | −0.1915[a] | 0.1787[a] | 1 | |
| 10 | Environmental dynamism | 1.0241 | 0.3499 | 0.4215[a] | 0.0613 | 0.101 | −0.1121 | −0.1209 | 0.0456 | 0.0112 | 0.0315 | 0.0581 | 1 |
| 11 | Firm Size | 4.7655 | 1.3199 | 0.0914 | 0.6022[a] | 0.1085 | 0.1026 | 0.0526 | −0.0259 | −0.1127 | −0.0708 | 0.1062 | 0.0902 |

187 firms followed from 2006 to 2011

[a] significant at 0.05 or below (two-tailed)

**Table 2** OLS regression

| Variables | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Past Sales | −0.000787 | −0.000616 | −0.000682 | −0.000783 | −0.000874 |
| | (0.000933) | (0.000931) | (0.000931) | (0.000922) | (0.000921) |
| Number of patents | −0.00505 | −0.00369 | −0.00347 | −0.00716 | −0.00711 |
| | (0.0154) | (0.0153) | (0.0153) | (0.0152) | (0.0151) |
| Operating cash flow | 0.000843 | 0.00496 | 0.00452 | 0.00625 | 0.00579 |
| | (0.00877) | (0.00899) | (0.00898) | (0.00889) | (0.00887) |
| Firm Age | −0.0135 | −0.0182 | −0.0177 | −0.0162 | −0.0155 |
| | (0.0155) | (0.0156) | (0.0156) | (0.0154) | (0.0154) |
| Firm Size | 0.0241 | 0.0249 | −0.00499 | 0.0293 | −0.00699 |
| | (0.0198) | (0.0197) | (0.0322) | (0.0196) | (0.0317) |
| Environmental Dynamism | 0.361*** | 0.367*** | 0.362*** | 0.659*** | 0.672*** |
| | (0.0604) | (0.0601) | (0.0601) | (0.138) | (0.137) |
| Mean Exploration and Exploitation | 0.00315 | 0.0144 | 0.0162 | 0.0125 | 0.0146 |
| | (0.0259) | (0.0264) | (0.0264) | (0.0261) | (0.0260) |
| Balance: \|Exploration – Exploitation\| [H1] | | −0.0714+ | −0.211+ | 0.175 | 0.0199 |
| | | (0.0383) | (0.125) | (0.111) | (0.154) |
| Balance × Firm Size [H2] | | | 0.0274 | | 0.0336 |
| | | | (0.0233) | | (0.0231) |
| Balance × Environmental dynamism [H3] | | | | −0.235* | −0.250* |
| | | | | (0.0997) | (0.1000) |
| Constant | 0.643*** | 0.678*** | 0.829*** | 0.352+ | 0.515* |
| | (0.158) | (0.158) | (0.203) | (0.208) | (0.236) |
| Observations | 187 | 187 | 187 | 187 | 187 |
| R-squared | 0.188 | 0.204 | 0.210 | 0.228 | 0.237 |
| Change in R-squared | | 0.016 | 0.022 | 0.04 | 0.049 |

Standard errors in parentheses

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, +$p < 0.10$

two. Young entrepreneurial firms may lack sufficient resources, capabilities, and experience to manage the competing demands and handle the tension of maintaining exploration and exploitation simultaneously within a firm.

Although ambidexterity is achievable in young entrepreneurial firms (e.g. Lubatkin et al. 2006; Schreuders and Legesse 2012; Volery et al. 2015), it might be very challenging to create a combinatory mindset within the firm (Kollmann et al. 2009). As noted, the entrepreneurial leader has a key role in encouraging employees to carrying out their activities in an ambidextrous fashion from the firm's earliest age (see e.g., Kuckertz et al. 2010; Volery et al. 2015). They may encounter interorganizational resistance as pursuing both exploration and explitation requires employee commitments in time and effort to roles and activities associated with both exploration and exploitation (Patel and Chrisman 2013). Particularly, because young entrepreneurial firms are owned and managed by one individual or a small group of individuals (Volery et al. 2015), they may not achieve harmonic ambidexterity if their employees are not sufficiently incentivized to allocate time optimally between conflicting demands from exploration and exploitation (Simsek et al. 2009). In their study of high-tech SMEs

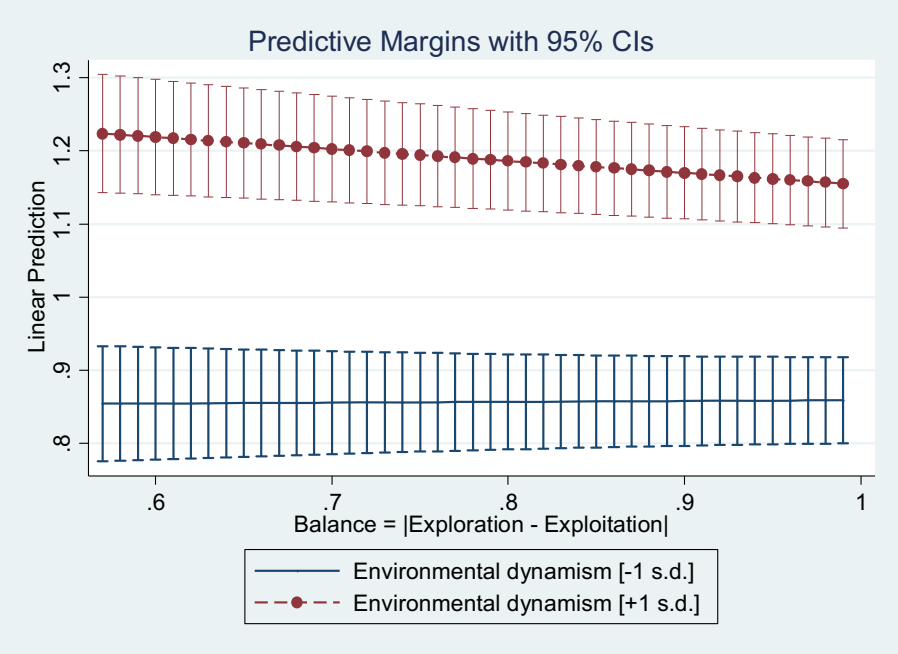


**Fig. 1** Moderation effects of environmental dynamism

Patel et al. (2013) demonstrated that those firms with human resource practices that create a proper context for ambidexterity benefit from growing their business. If the use of ambidexterity implies additional managerial complexity, conflicting demands, and costs for small entrepreneurial firms that might not have experience necessary to implement ambidexterity successfully (Van Looy et al. 2005; Voss and Voss 2013), it is hardly surprising that firms with more focus outperform them in terms of return reliability.

It appears to be particularly difficult for entrepreneurial firms to attain a variance-reducing effect from ambidexterity when they operate in dynamic environments. Because implementing ambidexterity may imply a challenge for such firms, their managerial challenges might be exacerbated when they encounter dynamic environments that are characterized by rapid shifts in technological capabilities, new entry, and demand uncertainty. If young entrepreneurial firms due to lack of experience in the business decide to concentrate on the wrong environmental changes or new technologies, they fail to manage ambidexterity successfully (Kollmann et al. 2009). Our results contrast with previous research on ambidexterity in more mature firms, which has indicated that in dynamic environments firms that pursue ambidexterity outperform firms that practice only exploration or exploitation (see Jansen et al. 2005; Simsek et al. 2009; Kim and Huh 2015b). This said, we did not find support for the assumption that the variance-reducing effect of managing ambidexterity in terms of either pursuing exploration or exploitation in entrepreneurial firms is greater when they are smaller in firm size. We believe those findings warrant further elaboration.

Organization population ecologists discuss the term "fitness," which can be defined as the probability that a given form of organization will persist in a certain environment

(Hannan and Freeman 1982). It advocates that whether individual organizations are consciously adapting or not, it is the environment that selects out the optimal combinations of organizations. However, certain organizational forms are more likely to fail or flourish in certain environmental circumstances (Hannan and Freeman 1982). It may be suggested that specialists (those that practice only exploitation or exploration) function better in a larger entrepreneurial company, whereas generalists (those who have organizational ambidexterity) are more likely to flourish in a small and flexible entrepreneurial firm (Simsek 2009). This may explain the lack of clear results of the firm size moderation.

Although the present results indicate that young entrepreneurial firms may fail to attain performance reliability by using ambidexterity due to their inability to play two games simultaneously and that it is especially the case when environmental dynamism is high, we want to highlight that the present study has several limitations. First, because this study focuses on the high-tech industry, where the need for change is the highest, the dynamics in low- or medium-tech industries could differ. For example, in low-tech industries, although the need for stability is higher, exploration could increase adaptability by leading to developing more refined routines. Second, our findings could not be generalized to other countries or industries.

From a perspective of practical implications, the results suggest that it is more advisable for young entrepreneurial firms that want to attain return stability to either pursue exploration or exploitation. Although our results suggest that entrepreneurial firms are unable to strike a balance between exploration and exploitation successfully and carry out the activities simultaneously, they may benefit from finding ways to switch back and forth between exploration actions as the current situation requires. Volery et al. (2015) found that while employees in entrepreneurial firms managed to handle the different requirements of new products, processes, routines, and structures one at a time, they were also able to switch between these requirements and the operative actions to exploit current product markets. Typically, there were longer periods of exploitation which were interspersed with bursts of exploration.

Because the current study indicates that many young entrepreneurial firms face challenges in achieving reliable returns when using both exploration and exploitation, there is need for research that helps us to understand how these challenges can be resolved. There is scope for more studies in which practices and behavioral patterns of ambidextrous entrepreneurial firms are identified. They would be helpful for providing current and nascent entrepreneurs with practical guidelines of how to be successful at ambidexterity.

As was highlighted earlier, especially in entrepreneurial firms, ambidexterity materializes from the efforts of the entrepreneur. Most studies investigate ambidexterity from a firm-level perspective, while there is a shortage of studies on an individual-level (Mom et al. 2009). Hence, there could be more studies that look into the background, skills, social capital, leadership styles and behavior of ambidextrous managers and entrepreneurs.

In terms of return stability, strategies combining both exploration and exploitation were found to be less successful in environments characterized by high dynamism. However, environmental dynamism is only one of the environmental contingencies that may influence the relationship between ambidexterity and performance stability. Environmental contingencies can also include, for example, munificence (e.g., Cao et

al. 2009) and competitive intensity (e.g., Auh and Menguc 2005; Kim and Huh 2015b). They could serve as moderators in future research that add to our understanding of the relationship between ambidexterity and performance stability.

## References


Abebe, M. & Angriawan, A. (2014). Organizational and competitive influences of exploration and exploitation activities in small firms. *Journal of Business Research*, *67*(3), 339–345.

Adler, P. S., Goldoftas, B., & Levine, D. I. (1999). Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organization Science*, *10*(1), 43–68.

Atuahene-Gima, K. (2005). Resolving the capability: rigidity paradox in new product innovation. *Journal of Marketing*, *69*(4), 61–83.

Auh, S. & Menguc, B. (2005). Balancing exploration and exploitation: the moderating role of competitive intensity. *Journal of Business Research*, *58*(12), 1652–1661.

Azadegan, A., Patel, C. P., & Parida, V. (2012). Operational slack and venture survival. *Production and Operations Management*, *22*(1), 1–18.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120.

Bateson, G. (1972). *Steps to an ecology of mind*. New York: Ballantine Books.

Bot, S. (2012). Process ambidexterity for entrepreneurial firms. *Technology Innovation Management Review*, *2*(4), 21–27.

Briscoe, F. (2007). From iron cage to iron shield? how bureaucracy enables temporal flexibility for professional service workers. *Organization Science*, *18*(2), 297–314.

Cao, Q., Gedajlovic, E., & Zhang, H. (2009). Unpacking organizational ambidexterity: dimensions, contingencies, and synergistic effects. *Organization Science*, *20*(4), 781–796.

Choi, Y. R. & Shepherd, D. (2005). Stakeholder perceptions of age and other dimensions of newness. *Journal of Management*, *31*(4), 573–596.

Cusumano, M. A. (1991). *Japan's software factories: A challenge to US management*. USA: OUP.

Deephouse, D. (1999). To be different, or to be the same? It's a question (and theory) of strategic balance. *Strategic Management Journal*, *20*(2), 147–166.

Dess, G. G. & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative Science Quarterly*, *29*(1), 52–73.

Dewey, J. (1922). *Human nature and conduct: An introduction to social psychology*. NY: Prometheus Books, Amherst.

DiMaggio, P. J. & Powell, W. W. (1983). The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, *48*, 147–160.

Dover, P. & Dierk, U. (2010). The ambidextrous organization: integrating managers, entrepreneurs and leaders. *Journal of Business Strategy*, *31*(5), 49–58.

Ebben, J. J. & Johnson, A. C. (2005). Efficiency, flexibility, or both? evidence linking strategy to performance in small firms. *Strategic Management Journal*, *26*(13), 1249–1259.

Farjoun, M. (2010). Beyond dualism: stability and change as a duality. *Academy of Management Review*, *35*(2), 202–225.

Fernhaber, S. & Patel, P. C. (2012). How do young firms manage product portfolio complexity? the role of absorptive capacity and ambidexterity. *Strategic Management Journal*, *33*(13), 1516–1539.

Frigotto, L., Coller, G., & Collini, P. (2014). Exploration and exploitation from start-up to sale: A longitudinal analysis through strategy and MCS practices. In U. Stettner, B. Aharonson, & T. Amburgey (Eds.), *Exploration and exploitation in early stage ventures and SMEs*. UK: Emerald Group Publishing.

Gibson, C. B. & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, *47*(2), 209–226.

Hannan, M. T. & Carroll, G. R. (1995). Theory building and cheap talk about legitimation: reply to Baum and Powell. *American Sociological Review*, *60*(4), 539–544.

Hannan, M. T. & Freeman, J. (1982). The population ecology of organizations. *American Journal of Sociology*, *82*(5), 929–964.

Hannan, M. T. & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, *49*(2), 149–164.

Hansen, L. P. & Singleton, K. J. (1983). Stochastic consumption, risk aversion, and the temporal behavior of asset returns. *The Journal of Political Economy*, *91*(2), 249–265.

He, Z. L. & Wong, P. K. (2004). Exploration vs. exploitation: an empirical test of the ambidexterity hypothesis. *Organization Science*, *15*(4), 481–494.

Hechavarria, D. M. & Reynolds, P. D. (2009). Cultural norms & business start-ups: the impact of national values on opportunity and necessity entrepreneurs. *International Entrepreneurship and Management Journal*, *5*(4), 417–437.

Hill, S. & Birkinshaw, J. (2014). Ambidexterity and survival in corporate venture units. *Journal of Management*, *40*(7), 1899–1931.

Hughes, P. J. (1986). Signalling by direct disclosure under asymmetric information. *Journal of Accounting and Economics*, *8*(2), 119–142.

Jansen, J., Van Den Bosch, F., & Volberda, H. (2005). Exploratory innovation, exploitative innovation, and ambidexterity: the impact of environmental and organizational antecedents. *Schmalenbach Business Review*, *57*, 351–363.

Jansen, J., Van Den Bosch, F., & Volberda, H. (2006). Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators. *Management Science*, *52*(11), 1661–1674.

Junni, P., Sarala, R., Taras, V., & Tarba, S. Y. (2013). Organizational ambidexterity and performance: a Meta-Analysis. *Academy of Management Perspectives*, *27*(4), 299–312.

Keats, B. W. & Hitt, M. A. (1988). A causal model of linkages among environmental dimensions, macro organizational characteristics, and performance. *Academy of Management Journal*, *31*(3), 570–598.

Kim, G. & Huh, M. G. (2015a). Innovation and survival in Korean SMEs: The moderating effect of competitive strategy. *Asian Journal of Technology Innovation*, *23*(1), 107–119.

Kim, G. & Huh, M. G. (2015b). Exploration and organizational longevity: the moderating role of strategy and environment. *Asia Pacific Journal of Management*, *32*(2), 389–414.

Kollmann, T., Kuckertz, A., & Stöckmann, C. (2009). Continuous innovation in entrepreneurial growth companies: exploring the ambidextrous strategy. *Journal of Enterprising Culture*, *17*(3), 297–322.

Kuckertz, A., Kohtamäki, M., & Droege, C. (2010). The fast eat the slow—the impact of strategy and innovation timing on the success of technology-oriented ventures. *International Journal of Technology Management*, *52*(1/2), 175–188.

Landau, M. & Chisholm, D. (1995). The arrogance of optimism: notes on failure-avoidance management. *Journal of Contingencies & Crisis Management*, *3*(2), 67–80.

LaPorte, T. R. & Consolini, P. M. (1991). Working in practice but not in theory: theoretical challenges of "high-reliability organizations". *Journal of Public Administration Research and Theory: J-PART*, *1*(1), 19–48.

Levinthal, D. A. & March, J. G. (1993). The myopia of learning. *Strategic Management Journal*, *14*(2), 95–112.

Lounamaa, P. H. & March, J. G. (1987). Adaptive coordination of a learning team. *Management Science*, *33*(1), 107–123.

Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. (2006). Ambidexterity and performance in small-to medium-sized firms: the pivotal role of top management team behavioral integration. *Journal of Management*, *32*(5), 646–672.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71–87.

March, J. G. (2006). Rationality, foolishness, and adaptive intelligence. *Strategic Management Journal*, *27*(3), 201–214.

Mas-Tur, A. & Soriano, D. R. (2014). The level of innovation among young innovative companies: the impacts of knowledge-intensive services use, firm characteristics and the entrepreneur attributes. *Service Business*, *8*(1), 51–63.

McGrath, R. G. (1999). Falling forward: real options reasoning and entrepreneurial failure. *Academy Of Management Review*, *24*(1), 13–30.

Miller, D. & Friesen, P. H. (1982). Innovation in conservative and entrepreneurial firms: two models of strategic momentum. *Strategic Management Journal*, *3*(1), 1–25.

Miller, D. & Friesen, P. H. (1983). Strategy-making and environment: the third link. *Strategic Management Journal*, *4*(3), 221–235.

Mom, T., Van Den Bosch, F., & Volberda, H. (2009). Understanding variation in managers' ambidexterity: investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science*, *20*(4), 812–828.

Oliver, C. (1997). The influence of institutional and task environment relationships on organizational performance: the Canadian construction industry. *Journal of Management Studies*, *34*(1), 99–124.

Parida, V. & Örtqvist, D. (2015). Interactive effects of network capability, ICT Capability, and financial Slack on technology-based small firm innovation performance. *Journal of Small Business Management*, *53*(S1), 278–298.

Parida, V., Westerberg, M., & Frishammar, J. (2012). Inbound open innovation activities in high-tech SMEs: the impact on innovation performance. *Journal of Small Business Management*, *50*(1), 283–309.

Patel, P. C. & Chrisman, J. J. (2013). Risk abatement as a strategy for R&D investments in family firms. *Strategic Management Journal*, *35*(4), 617–627.

Patel, P. C., Messersmith, J., & Lepak, D. (2013). Walking the tight rope: an assessment of the relationship between high-performance work systems and organizational ambidexterity. *Academy of Management Journal*, *56*(5), 1420–1442.

Perrow, C. (1999). *Normal accidents: Living with high-risk technologies* (2nd ed. ). NJ: Princeton University Press.

Piao, M. (2010). Thriving in the new: implication of exploration on organizational longevity. *Journal of Management*, *36*(6), 1529–1554.

Porter, M. E. (1980). *Competitive strategy*. New York: Free Press.

Porter, M. E. (1981). The contributions of Industrial Organization to Strategic Management. *Academy of Management Review*, *6*(4), 609–620.

Posen, H. E. & Levinthal, D. A. (2012). Chasing a moving target: exploitation and exploration in dynamic environments. *Management Science*, *58*(3), 587–601.

Preisendörfer, P. & Voss, T. (1990). Organizational mortality of small firms: the effects of entrepreneurial age and human capital. *Organization Studies*, *11*(1), 107–129.

Raisch, S. & Birkinshaw, J. (2008). Organizational ambidexterity: antecedents, outcomes, and moderators. *Journal of Management*, *34*(3), 375–409.

Raisch, S. & Hotz, F. (2010). Shaping the context for learning: Corporate alignment initiatives, environmental munificence, and firm performance. In S. Wall, C. Zimmermann, R. Klingebiel, & D. Lange (Eds.), *Strategic reconfigurations: Building dynamic capabilities in rapid-innovation-based industries*. Cheltenham: Edward Elgar Publishing.

Revilla, E., Prieto, I., & Prado, B. R. (2010). Knowledge strategy: its relationship to environmental dynamism and complexity in product development. *Knowledge and Process Management*, *17*(1), 36–47.

Rosenbusch, N., Brinckmann, J., & Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, *26*(4), 441–457.

Rothaermel, F. T. & Alexandre, M. T. (2009). Ambidexterity in technology sourcing: the moderating role of absorptive capacity. *Organization Science*, *20*(4), 759–780.

Santarelli, E. & Vivarelli, M. (2007). Entrepreneurship and the process of firm's entry, survival and growth. *Industrial and Corporate Change*, *16*(3), 455–488.

Schreuders, J. & Legesse, A. (2012). Organizational ambidexterity: how small technology firms balance innovation and support. *Technology Innovation Management Review*, *2*(2), 17–21.

Shepherd, D., Douglas, E., & Shanley, M. (2000). New venture survival: ignorance, external shocks and risk reduction strategies. *Journal of Business Venturing*, *15*(5–6), 393–410.

Simsek, Z. (2009). Organizational ambidexterity: towards a multilevel understanding. *Journal of Management Studies*, *46*(4), 597–624.

Simsek, Z., Heavey, C., Veiga, J., & Souder, D. (2009). A typology for aligning organizational Ambidexterity's conceptualizations, antecedents, and outcomes. *Journal of Management Studies*, *46*(5), 864–894.

Sitkin, S. B. & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behavior. *Academy of Management Review*, *17*(1), 9–38.

Terziovski, M. (2010). Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: A resource-based view. *Strategic Management Journal*, *31*(8), 892–902.

Titman, S. & Trueman, B. (1986). Information quality and the valuation of new issues. *Journal of Accounting and Economics*, *8*(2), 159–172.

Uotila, J., Maula, M., Keil, T., & Zahra, S. A. (2009). Exploration, exploitation, and financial performance: analysis of S&P 500 corporations. *Strategic Management Journal*, *30*(2), 221–231.

Van Looy, B., Martens, T., & Debackere, K. (2005). Organizing for continuous innovation: On the sustainability of ambidextrous organizations. *Creativity and Innovation Management*, *14*(3), 208–221.

Volery, T., Mueller, S., & von Siemens, B. (2015). Entrepreneur ambidexterity: a study of entrepreneur behaviours and competencies in growth-oriented small and medium-sized enterprises. *International Business Journal*, *33*(2), 109–129.

Voss, G. B. & Voss, Z. G. (2013). Strategic ambidexterity in small and medium-sized enterprises: implementing exploration and exploitation in product and market domains. *Organization Science*, *24*(5), 459–1477.

Wales, J. W., Patel, C. P., Parida, V., & Kreiser, P. M. (2013). Non-linear effects of entrepreneurial orientation on small firm performance: the moderating role of resource orchestration capabilities. *Strategic Entrepreneurship Journal*, *7*(2), 93–121.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180.

Wiklund, J., Baker, T., & Shepherd, D. (2010). The age-effect of financial indicators as buffers against the liability of newness. *Journal of Business Venturing*, *25*(4), 423–437.

Yang, T. T. & Li, C. R. (2011). Competence exploration and exploitation in new product development. *Management Decision*, *49*(9), 1444–1470.