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Organizational antecedents of exploration and exploitation in SMEs: The role of structural and resource attributes^{1 2}

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Abstract

Purpose - Scholars have recognized that formal hierarchical structures and slack resources are at the core of SMEs' attainment of ambidexterity. Surprisingly, few studies on SMEs have analyzed the extent to which these structural and resource attributes are associated with exploration and exploitation. This study thus examines how two structural attributes, formalization and structural empowerment, and two resource attributes, financial slack and human resource slack, affect exploration and exploitation in SMEs.

Design/methodology/approach - Data were gathered from a survey administered to the chief executive officers of 522 French SMEs. The research hypotheses were then tested using seemingly unrelated regressions to investigate the contrasts between the two components of ambidexterity.

Findings - The results show that structural empowerment and financial slack may be conducive to exploration and exploitation at the same time. By contrast, formalization and human resource slack impact only one of these two ambidexterity components in significant ways: the former may be a powerful lever for exploitation, while the latter may be a powerful lever for exploration.

Originality/value - Relying on a dual structure–resource perspective, this study allows us to discuss the distinct impacts that several organizational antecedents have on exploration and exploitation in the specific context of SMEs. It thus addresses the recent call to identify which antecedents are integrating and which are differentiating to help firms deal with ambidexterity.

Keywords: exploration, exploitation, organizational structure, slack resource, SME.

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1. Introduction

The seminal paper of March (1991) concerning organizational learning paved the way for extensive research on the duality of knowledge management in organizations. Researchers have acknowledged that a firm's success depends on its ability not only to explore new competencies and opportunities but also to exploit its existing skills and capabilities (Lavie *et al.*, 2010). The literature has thus widely recognized that both exploration and exploitation are necessary for firm performance and survival (Gupta *et al.*, 2006; Lavie *et al.*, 2010). This simultaneous need for exploration and exploitation has given rise to a specific field of inquiry concerning the concept of "ambidexterity," referring to firms' ability to both explore and exploit, which has become a subject of great interest (Koryak *et al.*, 2018). Scholars have notably paid most attention to the conditions likely to generate ambidexterity (e.g., Chang and Hughes, 2012; Jansen *et al.*, 2009; Kamaşak and Bulutlar, 2010; Koryak *et al.*, 2018).

However, the focus on ambidexterity as an overarching construct has tended to obscure the differences between its two components. Empirical studies on the antecedents of exploitation versus exploration remain limited (Lavie *et al.*, 2010). This might be seen as surprising given that many authors have insisted on the probable differences between the two. As mentioned by Koryak *et al.* (2018), "while some common antecedents of ambidexterity as an overarching construct have been identified...its constituent components—exploration and exploitation—tend to be associated with diametrically opposing factors" (414). Exploration and exploitation require fundamentally different structures, processes, strategies, cultures, and capabilities (He and Wong, 2004) and generate organizational tensions (Koryak *et al.*, 2018; Lubatkin *et al.*, 2006). For instance, exploration is usually associated with flexibility, organic structures, decentralization, loose cultures, improvisation and autonomy, whereas exploitation is often associated with efficiency, mechanistic structures, centralization, tight cultures, path dependence, and routinization (He and Wong, 2004; Koryak *et al.*, 2018). Overall, the

literature has suggested that numerous organizational factors can explain heterogeneity in firms' tendency to explore versus exploit, such as slack resources, organizational structure, absorptive capacity, culture, organizational age, and firm size (Lavie *et al.*, 2010). However, the arguments and findings regarding the effects of organizational antecedents on exploration versus exploitation are mixed. There is, therefore, a need to more thoroughly study the organizational antecedents that differentially influence exploration and exploitation (Jansen *et al.*, 2006; Lavie *et al.*, 2010), as well as the common antecedents that might favor ambidexterity (Raisch and Birkinshaw, 2008).

This study thus disentangles the main organizational antecedents of exploration and exploitation while focusing on small- and medium-sized enterprises (SMEs), which have been neglected in most empirical studies on the subject (Abebe and Angriawan, 2014). In contrast to prior studies' over-emphasis on ambidexterity as an overarching construct, we delineate the contrasts between its two components. As the organizational antecedents to be investigated can cover a wide spectrum, our study relies on a dual structure–resource perspective to establish a general framework that encompasses two fundamental facets of exploration–exploitation antecedents: structural and resource attributes. These are considered two of the central facets of organizational activities and appear as fundamental anchors in the management scholarship. For instance, authors have tended to consider structure and resources as two fundamental components of the “organization concept” (Sanchez and Heene, 2004, cited by Cordes-Berszinn, 2013) or the business model (Demil and Lecocq, 2010). The literature has also recognized that both structural and resource attributes play a key role in ambidexterity (e.g., Jansen *et al.*, 2012). In the specific context of SMEs, several authors have suggested that formal hierarchical structures and slack resources impact exploration and exploitation activities and are at the core of SMEs' attainment of ambidexterity (Abebe and Angriawan, 2014; Lubatkin *et al.*, 2006; Prajogo and McDermott, 2014). Thus, our study of

SMEs examines, on the one hand, formalization and structural empowerment (as structural attributes) and, on the other, financial slack and human resource slack (as resource attributes). Based on this specific distinction, we build a series of hypotheses to examine the expected differential influence of these antecedents on exploration versus exploitation. We test our hypotheses using an original database comprising 522 French SMEs. Our findings then provide empirical evidence about the distinct effects of several organizational antecedents on exploration and exploitation.

This paper is organized as follows. We first explain the theoretical and conceptual bases of our research hypotheses. Then, we present the dataset and the study's methodology. We then present and discuss the results before concluding with implications and future research directions.

2. Theory and research hypotheses

2.1. Exploration, exploitation, and ambidexterity challenges in SMEs

Following March (1991), the literature usually distinguishes between two generic knowledge strategies, exploration and exploitation, which are both associated with learning and innovation albeit of different types (Gupta *et al.*, 2006). On the one hand, firms that focus on exploration “strive to develop capabilities to excel at the creation or acquisition of new knowledge” (Bierly and Daly, 2007: 494). The aim is to create new knowledge through experimental and exploratory actions. This involves pursuing business opportunities that are radically new for the firm (Sirén *et al.*, 2012). Exploration can thus manifest in the use of unfamiliar technologies and the creation of new products for which the demand is still unknown (Greve, 2007) or in new markets (Lubatkin *et al.*, 2006). Its key outputs are, therefore, often associated with radical innovations (Bierly and Daly, 2007; Jurksiene and Pundziene, 2016). On the other hand, firms that focus on exploitation “develop capabilities to

excel at the ability to leverage existing knowledge to rapidly create new organizational products and processes” (Bierly and Daly, 2007: 494). Exploitation refers to the use and refinement of existing knowledge, products and technologies (Greve, 2007). The aim is to maintain and refine current competitive advantages by efficiently managing existing resources and capabilities (Sirén *et al.*, 2012). Exploitation can thus lead to improvements in existing technologies or product features designed to meet the needs of existing customers (Lubatkin *et al.*, 2006). Its key outputs are, therefore, often associated with incremental innovations (Bierly and Daly, 2007; Jurksiene and Pundziene, 2016).

While both exploration and exploitation are necessary for firms’ success and survival (Gupta *et al.*, 2006; Lavie *et al.*, 2010), they can be viewed as two fundamentally different strategies that involve different goals (Bierly and Daly, 2007; Sirén *et al.*, 2012). They rely on different routines, activities, and competences (Jurksiene and Pundziene, 2016) and compete for scarce firm resources (He and Wong, 2004; March, 1991). The tensions associated with exploration and exploitation have thus become a central issue in the literature (He and Wong, 2004; O’Reilly and Tushman, 2013). However, several authors have regretted that the focus has been on large firms and not on SMEs, which are typically more resource-constrained and, consequently, face greater challenges while managing these tensions (Abebe and Angriawan, 2014; Bierly and Daly, 2007; Lubatkin *et al.*, 2006).

In fact, exploration and exploitation in SMEs differ from those in large firms, given their structural and resource attributes. For instance, Prajogo and McDermott (2014: 522) suggested that “differences in such factors as slack resources or hierarchical administrative systems create for these firms a very different landscape from that faced by their larger counterparts.” SMEs may lack the slack resources required to realize the benefits of organizational learning (Abebe and Angriawan, 2014). They may also lack the kind of hierarchical administrative systems that can assist in managing the tensions associated with

exploration and exploitation (Lubatkin *et al.*, 2006). The hierarchical systems in SMEs and their lower level of slack resources have therefore often been seen as factors that impede their activities of exploration and exploitation (Abebe and Angriawan, 2014, Bierly and Daly, 2007; Lubatkin *et al.*, 2006; Prajogo and McDermott, 2014). Surprisingly, few empirical studies on SMEs analyze the extent to which these attributes are associated with exploration and exploitation.

2.2. *Organizational antecedents of exploration and exploitation in SMEs*

As structural attributes (in terms of formal hierarchical structures) and resource attributes (in terms of slack resources) are at the core of SMEs' attainment of ambidexterity (Abebe and Angriawan, 2014; Lubatkin *et al.*, 2006; Prajogo and McDermott, 2014), we examine their different effects on exploration and exploitation.

2.2.1. *Structural attributes: formalization and empowerment.* Two structural antecedents of exploration and exploitation, degree of formalization and decentralization level through structural empowerment, are considered in this study. Formalization and (de)centralization are indeed the traditional attributes most often used to describe formal hierarchical structures (e.g., Caruana *et al.*, 1998; Jansen *et al.*, 2006; Jung *et al.*, 2008).

Formalization is the extent to which a firm regulates the work-related activities of employees with written rules and formal procedures to prescribe behavior (Jung *et al.*, 2008). It thus relates to the degree to which rules, procedures, and instructions are codified, formalized, or written down in the firm (Jansen *et al.*, 2006; Prajogo and McDermott, 2014).

The literature posits that formalization impedes innovation and that, conversely, low formalization, high flexibility, and low emphasis on work rules facilitate innovation and authorize openness, which can lead to new ideas and behaviors (Damanpour, 1991). In fact, excessive rules and procedures can constrain deviations from established practices and hinder

fluid work processes (Jung *et al.*, 2008). High formalization may thus limit the chances of generating new knowledge and the creation of new opportunities, innovations, or products (Espinosa and Lindahl, 2016). In line with this view, however not consensual among scholars (e.g., Chang and Hughes, 2012; Pertusa-Ortega *et al.*, 2010), some studies have suggested that formalization may act as a frame of reference that restrains exploration (e.g., Jansen *et al.*, 2006; Prajogo and McDermott, 2014). The empirical findings are mixed, however. For instance, Prajogo and McDermott (2014) found a non-significant relationship between formalization and exploration, though they expected a negative one. By contrast, formalization is usually established to ensure that employers act in a predictable way (Jansen *et al.*, 2006). It can benefit the use and application of knowledge (Pertusa-Ortega *et al.*, 2010). The literature has suggested that it helps reinforce the efficiency and improvement of existing activities by establishing ingrained patterns of behavior (Chang and Hugues, 2012) and that it positively correlates with the quality of the products or services offered by the firm (Pertusa-Ortega *et al.*, 2010). Several authors thus argue for a positive relationship between formalization and exploitation (e.g., Chang and Hugues, 2012; Jansen *et al.*, 2006; Prajogo and McDermott, 2014). In sum, “formalization is expected to constrain exploration and facilitate exploitation” (Lavie *et al.*, 2010: 122). We may, thus, hypothesize the opposite influences of formalization on exploration and exploitation and posit the following hypothesis:

Hypothesis 1a, b. The higher the degree of formalization in an SME, (***a***) the lower its level of exploration and (***b***) the higher its level of exploitation.

Structural empowerment is “the extent to which an organization makes use of structures, policies, and practices supporting employee empowerment” (Seibert *et al.*, 2004: 334). This refers to the process by which a manager shares his/her power (i.e., formal authority or control over organizational resources) with subordinates (Conger and Kanungo,

1988). Structural empowerment, thus, concerns the policies and practices of delegation and decentralization and takes place in participative work environments (Conger and Kanungo, 1988; Ford and Fottler, 1995). This concept therefore captures the inverse of centralization (Huang *et al.*, 2011), while permitting a more encompassing view than the traditional concepts of decentralization, delegation and participatory management do (Ford and Fottler, 1995).

The literature has suggested that a high level of centralization hinders innovation, as the concentration of decision-making authority hampers innovative solutions (Damanpour, 1991). It restrains innovativeness, risk-taking, and proactiveness (Caruana *et al.*, 1998), which are associated with exploration. Conversely, a low level of centralization may encourage creativity (Pertusa-Ortega *et al.*, 2010). Moreover, when employees work in a high task-autonomy environment, knowledge creation is promoted (Pertusa-Ortega *et al.*, 2010), and the likelihood of new opportunities increases (Espinosa and Lindahl, 2016). Empowerment has thus been considered as an antecedent of creative processes (Zhang and Bartol, 2010), and a positive relationship between decentralization and exploration has thus been expected (Jansen *et al.*, 2006; Prajogo and McDermott, 2014). However, empirical studies lead to less obvious conclusions regarding exploitation. If “it is commonly argued that a centralized organizational structure is needed to facilitate exploitation” (Boumgarden *et al.*, 2012: 593), this proposal has not been systematically proven. For instance, although Jansen *et al.* (2006) and Prajogo and McDermott (2014) hypothesized that decentralization and exploitation are negatively associated, both found a non-significant relation. By contrast, Ebers and Maurer (2014) showed that structural empowerment, in terms of greater discretion in decision making and training, increases employees’ commitment, which in turn leads to greater effort made to transform and exploit relevant knowledge. This last study’s conclusion is in line with the

finding in ambidexterity studies that empowerment may be conducive to both exploration and exploitation (Chang, 2016). Consequently, we propose the following hypothesis:

Hypothesis 2a, b. The higher the empowerment in an SME, (*a*) the higher its level of exploration, and (*b*) the higher its level of exploitation.

2.2.2. *Resource attributes: financial slack and human resource slack.* Slack is defined as “the pool of resources in an organization that is in excess of the minimum necessary to produce a given level of organizational output” (Nohria and Gulati, 1996: 1246). It comprises “potentially utilizable resources that can be diverted or redeployed for the achievement of organizational goals” (George, 2005: 661). For several decades, scholars have been interested in the implications of slack for performance (e.g., George, 2005; Lecuona and Reitzig, 2014; Tan and Peng, 2003), innovation (e.g., Damanpour, 1991; Nohria and Gulati, 1996), exploratory, and/or exploitative activities (e.g., Jansen *et al.*, 2012; Josephson *et al.*, 2016; Voss *et al.*, 2008). However, there is no consensus on the question of whether slack has positive or negative effects (Lecuona and Reitzig, 2014; Marlin and Geiger, 2015; Tan and Peng, 2003). To better understand its effects, the literature has recommended distinguishing between different types of slack, which may impact firm behavior in different ways (Geiger and Makri, 2006; Wang *et al.*, 2016). In particular, financial slack and human resource slack may have different implications (Mishina *et al.*, 2004; Voss *et al.*, 2008; Wang *et al.*, 2016).

Financial slack usually refers to unabsorbed slack (Wang *et al.*, 2016), which is composed of excess uncommitted liquid resources (Damanpour, 1991; Sidhu *et al.*, 2004) and can be easily redeployed and used (Huang and Li, 2012; Tan and Peng, 2003). When such slack exists, “managers may feel free to pursue more risky but potentially novel projects” (Geiger and Makri, 2006: 99). Managers are less likely to worry about projects’ failure risk when this type of slack can be used to buffer potential project losses (Huang and Li, 2012).

From this perspective, slack encourages risk taking and experimentation, thus invoking exploration (Sidhu *et al.*, 2004). Firms that possess high levels of financial slack may tend to deploy slack for risky exploration, while low levels of financial slack may tend to hinder exploration (Voss *et al.*, 2008). In other words, financial slack represents a level of financial flexibility that makes expansion into new and uncertain businesses less problematic (Mishina *et al.*, 2004) and helps firms deal with challenges or search for opportunities, thus supporting exploration activities (Josephson *et al.*, 2016). Conversely, firms with poor financial slack may tend to “focus on capturing and harvesting existing value, causing a stronger shift toward exploitation” (Josephson *et al.*, 2016: 542-543). As mentioned by Voss *et al.* (2008), exploitation is less demanding on financial resources, while promising returns that are smaller but more certain. Instead of focusing on generating future capabilities, firms with low financial slack may emphasize their current operations, strategies, and capabilities, thus invoking exploitation (Josephson *et al.*, 2016). Contrariwise, firms with increasing financial resources perceive the modest returns promised by exploitation as less attractive compared to the higher returns that could be obtained via exploration (Voss *et al.*, 2008). In sum, the literature has suggested that increased financial slack may be associated with increased exploration, whereas decreased financial slack may lead to a shift toward exploitation (Josephson *et al.*, 2016; Voss *et al.*, 2008). Hence, we propose the following hypothesis:

Hypothesis 3a, b. The greater an SME’s financial slack is, **(a)** the higher its level of exploration and **(b)** the lower its level of exploitation.

Human resource slack is “the amount of human resources in excess of what is required” (Wang *et al.*, 2016: 506). It can be thought of as absorbed slack, in which a firm has more employees than necessary to operate effectively, thus generating expenses greater than what are necessary (Geiger and Makri, 2006). Such absorbed resources are, however, more difficult

to redeploy (Huang and Li, 2012; Tan and Peng, 2003) and are already committed to a specific use (Voss *et al.*, 2008).

The literature has thus recognized that human resource slack is mostly path-dependent (Mishina *et al.*, 2004; Wang *et al.*, 2016). It is concerned with existing organizational arrangements, thus invoking exploitation (Mishina *et al.*, 2004; Voss *et al.*, 2008; Wang *et al.*, 2016). Indeed, human resource slack can be seen as “a pool of expansion-consistent talent that can be allocated in ways that build upon what an organization has already done” (Mishina *et al.*, 2004: 1184). Consequently, this type of slack cannot be easily or flexibly allocated in opportunistic ways that are not connected to prior organizational routines (Mishina *et al.*, 2004). Furthermore, human resource slack “might be associated with political and cognitive inertia that make expansion into new product domains risky or unpopular” (Mishina *et al.*, 2004: 1184). It tends to limit the propensity to act in new areas that would require skills other than those available (Mishina *et al.*, 2004; Voss *et al.*, 2008). As the human resource skills available in the firm are likely to be most applicable to incumbent product domains, firms with high levels of human resource slack may be less willing to explore novel contexts (Voss *et al.*, 2008) or follow a product expansion strategy (Mishina *et al.*, 2004). This explanation competes with another that views free periods of time allocated to employees as an opportunity to engage in exploration (Garud *et al.*, 2013). However, the freedom dedicated to invention is enjoyed primarily by engineering and research personnel. Since we are interested in SMEs, there are important caveats regarding the transferability of this kind of argument. In sum, one may suggest that human resource slack may be negatively associated with exploration but positively associated with exploitation in SMEs. We therefore posit the following hypothesis:

Hypothesis 4a, b. The higher an SME’s human resource slack, (**a**) the lower its level of exploration and (**b**) the higher its level of exploitation.

3. Research method

3.1. Sample and data collection

Data were gathered from a survey conducted via face-to-face interviews using a questionnaire with the chief executive officers (CEOs) of 522 French SMEs. These CEOs were contacted by the administration of a regional district and had to respond to the questionnaire as a prerequisite for entering an SME-dedicated training program to which they had applied.

Reflecting the majority of French SMEs, the firms in our sample are rather small: 39.4% have fewer than 10 employees; 48.7% have between 10 and 49; and the others have between 50 and 250. However, their profiles are diverse and they operate in a wide range of economic sectors. Therefore, the size and variety of the sample make it useful for an empirical analysis.

As the data were collected through a questionnaire survey, we investigated potential common method bias. We ran a Harman's single factor test by introducing all Likert-based items in an exploratory analysis. No component explained more than 30% of the variance, suggesting that common method bias is not an issue. Moreover, we also introduced variables that were not based on Likert scales (e.g., number of employees). The variance explained by the main component was shown to systemically decrease, confirming the absence of common method bias.

3.2. Variables

3.2.1. Exploration and exploitation. Exploration and exploitation were measured using the two multi-item scales developed by Bierly and Daly (2007). Respondents indicated on a five-point scale (1 = "strongly disagree;" 5 = "strongly agree") how accurately each statement described their firm. The four items in the exploration scale focused on the extent to which the SME excelled at developing radically new knowledge ("We frequently experiment with

radical new ideas;” “At our company, employees frequently come up with creative ideas;” “Compared to our principal competitors, a high percentage of our company sales come from new products launched within the past 3 years;” “We are usually one of the first companies in our sector to use new, breakthrough technologies”). The three items in the exploitation scale focused on the extent to which it successfully exploited existing knowledge areas (“At our company, a strong emphasis is placed on improving efficiency;” “Our company excels at refining existing technologies;” “We frequently adjust our procedures, rules, and policies to make things work better”). As expected, the items loaded on two separate components. Moreover, the two scales exhibit acceptable reliability (Cronbach’s alpha = 0.76 and 0.72 for exploration and exploitation respectively).

3.2.2. *Organizational antecedents: formalization, empowerment, and slack.* To measure the degree of formalization, we adapted three items from the scale used by Nohria and Gulati (1996). Each respondent was asked to indicate the extent (1 = “definitely false;” 5 = “definitely true”) to which several conditions applied to his/her firm (“For most jobs there are well-developed rules;” “Decisions are closely monitored to ensure that rules and policies are followed;” “For most situations, there are manuals that define the course of action to be taken”). Factor analysis indicates a one-dimensional construct, and reliability appears acceptable (Cronbach’s alpha = 0.78).

To measure structural empowerment, nine items were extracted and adapted from the scale of empowerment climate proposed by Nauman *et al.* (2010). The five-point scale (1 = “strongly disagree;” to 5 = “strongly agree”) takes into account organizational aspects related to three dimensions, as is common in the literature (Nauman *et al.*, 2010; Seibert *et al.*, 2004): (1) information sharing (item example: “Easy access to information and data on firm’s projects”); (2) autonomy through boundaries (item example: “Clear understanding of individual roles and responsibilities”); and (3) responsibility and accountability (item

example: “Delegate responsibilities”). As expected, these three components formed a single unidimensional construct, and reliability appears satisfactory (Cronbach’s alpha = 0.87).

Financial slack comprises the cushion of resources that a firm may allocate to new activities without divesting existing ones. Traditional measures of financial slack may be of little relevance in the SME context. Common measures such as cash reserves (George, 2005; Voss *et al.*, 2008) provide a poor measure of slack resource in SMEs, as most seldom have this kind of slack. However, some SMEs may have access to supplementary financial sources in case of need. We thus measured financial slack as the variety of sources that a firm considered easily available. The respondents were asked to indicate the source(s) of financing that they could easily mobilize if the need arose. Eight sources were proposed: (a) self-financing, (b) current shareholders, (c) new shareholders, (d) venture capital, (e) credit loans, (f) leasing, (g) cash credit, and (h) public funding and public grants. Each source of financing was rated “yes” (1) or “no” (0). Then, to estimate the variety of sources, the responses were added up for a summative measure ranging from 0 to 8.

Human resource slack refers to the surplus of resources in an organization for ongoing activities (Wang *et al.*, 2016). The capability to undertake further projects with the same workforce is therefore an accurate indicator of this type of slack. We thus measured human resource slack as the growth in turnover an organization could sustain without increasing its size. Respondents were asked which percentage of growth in turnover their firm could sustain without increasing (1) the global number of employees and (2) the number of management supervisors. To prevent biases due to firm size, we used the logarithmic differences (see Levratto *et al.*, 2018), for each of the two categories of employee, between the turnover supposedly possible without increasing personnel and the current turnover. The two indicators loaded on a single factor and exhibited good reliability that permitted aggregation (Cronbach’s alpha = 0.78).

3.2.3. Control variables. We controlled for possible alternative explanations by including several control variables. First, firm size (measured through the natural logarithm of number of employees) was taken into account, as it can have direct effects on innovation activities. Second, firm age was included, as it is often considered a proxy for experience that may substantially affect organizational structure and resource development. Third, given that SMEs are often managed by a single person or a very small group of individuals, we also considered the entrepreneur's experience in a top management position (measured through the natural logarithm of years). Fourth, group belonging (0 or 1) was considered, as it entails that the firm's strategy is consistent with general guidelines that may come from a higher level. Fifth, we added a dummy perceptual variable that captured whether the firm activity followed a growth trajectory or not. Indeed, the opportunities generated by growth are likely to foster strategic behaviors such as exploration and exploitation. Sixth and finally, we introduced 10 industry dummy variables, according to the first digit of the NAF code (Nomenclature of French Activity), to control for sectoral differences.

3.3. Descriptive statistics and correlations

Table 1 displays the main descriptive statistics and correlations among variables. We observe that exploration and exploitation are strongly correlated, thereby justifying a simultaneous estimation of both. Formalization and structural empowerment are also positively associated. Therefore, firms can simultaneously pursue both without contradiction. All the other correlations are much lower, suggesting that no collinearity concerns arise.

INSERT TABLE 1 HERE

4. Results and discussion

Our hypotheses rely on the assumption that several organizational characteristics have distinct impacts on exploration and exploitation. Therefore, we needed to discriminate between the

influences that a given explanatory organizational antecedent may have on the two dependent variables. To this end, we built two models that were estimated simultaneously following the seemingly unrelated equation method. While seemingly unrelated regressions with identical explanatory variables provide the same estimates as OLS regression, this method has a main advantage for our analysis: considering the equation system as a whole, it provides fit indices and correlations between residuals that apply at the system level. The models estimated with this method are presented in Table 2. Models 1 and 2 aim at explaining exploration and exploitation, respectively. The results are shown in Figure 1.

Whenever an explanatory variable seemed to have the same effect (namely positive or negative) on the two dependent variables, we conducted post-hoc analyses to compare the intensity of these two relationships by testing the difference between the coefficients of the two equations. For that, we performed a Theil's test with the F statistic, with the null hypothesis that there is no difference between the coefficients or, in other words, that the effects on exploration versus exploitation cannot be differentiated in intensity.

INSERT TABLE 2 HERE

INSERT FIGURE 1 HERE

4.1. Effects of structural attributes on exploration and exploitation

The results show that formalization positively influences exploitation, thus supporting H1b. However, while formalization does not seem to favor exploration, it does not impede it either. We therefore reject H1a, which predicted a negative relationship. This is in line with previous studies that also find no support for the expected negative effect of formalization on exploration, while finding support for the expected positive effect on exploitation (e.g., Jansen *et al.*, 2006; Prajogo and McDermott, 2014). While formalization might not be harmful to exploration (Jansen *et al.*, 2006; Pertusa-Ortega *et al.*, 2010), it is clearly more beneficial to exploitation. However, “overemphasis on exploitation will trap an organization in sub-optimal

equilibria and result in obsolescence of an organization's outputs" (Chanda *et al.*, 2018: 1033). Hence, one may suggest that it might ultimately contribute to a "competence trap" (Levinthal and March, 1993) or "exploitation trap" (Sirén *et al.*, 2012) at the expense of exploration and ambidexterity in the long run.

Regarding structural empowerment, this antecedent is strongly and positively associated with both exploration and exploitation. H2a and H2b are therefore supported. The F-test reveals, moreover, that these influences cannot be differentiated in intensity ($F = 0.277$). Our findings thus suggest that structural empowerment may help to achieve ambidexterity given its significantly positive effects on both exploration and exploitation in an undifferentiated way. These results are in line with previous studies that point to the importance of decentralization and worker training as key facilitators of ambidexterity (Gibson and Birkinshaw, 2004). They are also similar to the study of Ebers and Maurer (2014), which shows that empowerment (in terms of discretion in decision-making and training) is positively associated with both potential absorptive capacity (i.e., the capacity to acquire and assimilate external knowledge) and realized absorptive capacity (i.e., the capacity to transform and exploit knowledge) of the firm.

4.2. Effects of resource attributes on exploration and exploitation

Financial slack positively influences exploration, as expected, but also positively influences exploitation. H3a is hence validated, whereas H3b (predicting a negative relationship with exploitation) is rejected. In addition, the F-Test shows that the positive effects of financial slack on exploration versus exploitation cannot be differentiated in intensity ($F = 0.614$). While financial slack, unabsorbed slack that is easily deployable, is seen as a lever for exploration (Josephson *et al.*, 2016; Voss *et al.*, 2008), it may also be used to optimize current processes and refine current market positions (Bradley *et al.*, 2011) and may thus contribute equally to exploitation. These findings suggest that financial slack might be a lever for

ambidexterity in SMEs insofar as it favors its two components in an undifferentiated way. These results are in line with Jansen *et al.* (2012), who suggest that “uncommitted financial resources within organizations...are highly flexible and provide opportunities for ambidextrous units” (1291). Deploying excess financial resources could thus help to mitigate potential adverse consequences when facing paradoxical tensions encountered through exploration and exploitation (Cao *et al.*, 2009; Jansen *et al.*, 2012).

Human resource slack has a positive impact on exploration, while its effect on exploitation is only marginally significant. Hence, H4a is rejected and H4b receives only partial support. While the effects of human resource slack tend to be positive for both exploration and exploitation, the F-test reveals that its influence on exploration is stronger than that on exploitation ($F = 4.886$, $p < 0.05$). Contrary findings were expected, given that absorbed resources such as human resource slack are more difficult to redeploy for exploration in novel contexts than are unabsorbed resources such as financial slack (Voss *et al.*, 2008). A reasonable interpretation is that not all excess human resources may be difficult to redeploy in novel contexts; it may depend on the types of employees concerned and the types of knowledge they possess (Lecuona and Reitzig, 2014). Overall, our findings demonstrate that human resource slack can be a powerful lever, but especially for exploration. However, “overemphasis on exploration fails to generate a sufficient number of timely wins and may lead to an organization losing its way in its perpetual exploration of novelty” (Chanda *et al.*, 2018: 1033). One may therefore suggest that this type of slack might ultimately contribute to a “failure trap” (Levinthal and March, 1993) at the expense of exploitation, and thus of ambidexterity, in the long run.

5. Conclusion

While SMEs' formal hierarchical systems and lower level of slack resources have often been seen as factors that impede their ability to simultaneously explore and exploit (Abebe and Angriawan, 2014, Bierly and Daly, 2007; Lubatkin *et al.*, 2006), few studies have tested the effects of these organizational antecedents (Prajogo and McDermott, 2014). Our study thus contributes to the literature on the antecedents of exploration and exploitation by highlighting the contrasting impacts of structural and resource attributes in the specific context of SMEs. It constitutes an effort to unpack ambidexterity, which is usually seen as an inclusive construct. In doing so, we address the call from Koryak *et al.* (2018) to identify which antecedents are integrating and which are differentiating to help firms deal with ambidexterity.

Our findings reveal the extent to which structural empowerment and financial slack may be conducive to both exploration and exploitation. Their effects do not differ depending on whether exploration or exploitation is considered. While empowerment may be positively related to innovation capability for SMEs (Cakar and Ertürk, 2010; Sulistyono, 2016), thus working in favor of exploration, it may contribute just as much to improving operations and efficiency, thus working in favor of exploitation. Likewise, while financial slack may contribute to exploitation, it may also contribute equally to exploration by offering the financial flexibility (Josephson *et al.*, 2016) that many SMEs lack. One implication of those results is that both empowerment and financial slack can be powerful levers for ambidexterity in SMEs. As ambidexterity represents a critical challenge for SMEs (Voss and Voss, 2013), identifying such facilitators is essential for SME managers, who seek to achieve a balance between exploration and exploitation for sustained performance.

Conversely, our findings reveal that formalization and human resource slack significantly impact only one of the two components of ambidexterity: the former may be a powerful lever for exploitation, while the latter may be a powerful lever for exploration. By contributing to either exploration or exploitation, without impeding the other, formalization

and human resource slack are likely to alter the exploitation–exploration mix. In that case, the question arises as to whether the distinct influence may cause an imbalance between exploration and exploitation (Cao *et al.*, 2009; He and Wong, 2004), which could lead to “traps” (Levinthal and March, 1993; Sirén *et al.*, 2012) and increased risk in SMEs (Cao *et al.*, 2009). However, identifying a specific effect on one ambidexterity component does not exclude an indirect positive effect on the other. This echoes the observation that exploration and exploitation are complementary forces that tend to reinforce each other over time (Bierly and Daly, 2007; He and Wong, 2004; Koryak *et al.*, 2018). In addition, this invites to more deeply address the meaning of the so-called balance between exploitation and exploration, calling for “a new balance discussion” (Chanda *et al.*, 2018). As suggested by Koryak *et al.* (2018), “rather than striving for a fixed balance between the two, firms need to be clear about the nature of the balance they wish to achieve” (424).

This study has several limitations that suggest opportunities for future research. First, it would be useful to take into account structural attributes other than those examined here. For instance, recent studies in organizational learning have examined complexity, in addition to formalization and (de)centralization, to describe organizational structure (e.g., Espinosa and Lindahl, 2016; Pertusa-Ortega *et al.*, 2010). In the same vein, it would be interesting to include the traditional concept of “centralization.” While structural empowerment has been used to capture the inverse of centralization (Huang *et al.*, 2011), these are two distinct concepts (Jung *et al.*, 2008) that might have different effects. The second limitation concerns the measures of slack. The measure of human resource slack used in this study might not capture all the complexity of this concept. More generally, the question of what is the most appropriate operationalization of slack has been vigorously debated (Mishina *et al.*, 2004; Nohria and Gulati, 1996). Thus, future studies could reflect on the appropriate measures of slack in the specific context of SMEs. Third, we recognize that organizational antecedents do

not work in isolation when impacting exploration and exploitation. As recommended in the literature (Koryak *et al.*, 2018; Raisch and Birkinshaw, 2008), it would therefore be useful to examine how such antecedents interact and complement each other.

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Table 1 - Descriptive statistics and correlations

	Min.	Max.	Moy.	σ	Exploration	Exploitation	Empowerment	Formalization	Fin. slack	HR slack	Employees (log)	Firm age (log)	Entr.'s exp. (log)	Group
Exploration	1.00	5.00	2.73	1.01										
Exploitation	1.00	5.00	3.46	0.88	0.48***									
Empowerment	1.22	5.00	3.79	0.69	0.26***	0.33***								
Formalization	1.00	5.00	3.02	1.00	0.12**	0.34***	0.24***							
Fin. slack	0.00	8.00	4.12	1.50	0.14**	0.13**	0.03	0.09*						
HR slack	0.00	6.56	3.1	0.83	0.16***	-0.03	0.04	-0.07	-0.04					
Employees (log)	0.69	5.44	2.75	0.99	0.05	0.20***	0.04	0.30***	0.12**	-0.33***				
Firm age (log)	0.00	5.91	2.85	0.95	-0.16***	-0.03	-0.17***	0.11*	-0.02	-0.28***	0.45***			
Entr.'s exp. (log)	3.18	4.48	3.83	0.19	-0.13**	-0.09*	0.01	0.08	0.00	-0.07	0.14**	0.21***		
Group	0.00	1.00	0.25	0.43	0.03	0.06	0.01	0.14**	0.06	-0.12**	0.38***	0.15***	0.01	
Growth trend	0.00	1.00	0.45	0.50	0.21***	0.18***	0.17***	0.09*	0.05	0.02	-0.05	-0.26***	-0.11*	-0.05

Table 2 - Seemingly unrelated regressions

	Model 1 - Exploration	Model 2 - Exploitation
Empowerment	0.283*** (0.062)	0.319*** (0.052)
Formalization	0.029 (0.043)	0.200*** (0.037)
Fin. slack	0.082** (0.027)	0.058* (0.023)
HR slack	0.210*** (0.052)	0.083† (0.044)
Firm age (log)	-0.004 (0.055)	0.006 (0.047)
Employees (log)	0.123* (0.053)	0.149*** (0.045)
Entrepreneur's exp. (log)	-0.549** (0.212)	-0.513** (0.179)
Group	0.026 (0.100)	-0.059 (0.085)
Growth trend	0.224** (0.085)	0.143* (0.072)
Industry dummies	Included	Included
(Intercept)	1.909 (1.047)	2.732** (0.885)
R2	0.204	0.261
adj. R2	0.175	0.235
Syst. R2		0.229
Resid. corr.		0.400

*** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.1

Figure 1 – Effects of organizational antecedents on exploration and exploitation

