**Risk Driven Innovation in the Not So Boring Accountancy Profession**

**Abstract**

The accountancy profession is in a period of dynamic innovation driven change as new information technologies reconfigure the way business is conducted and the services that accountancy firms offer to their clients. As with all innovation, there is also the potential for disruptive change with risky outcomes. However, not all businesses are willing to take on these risks. In this paper, we explore two research questions: Who is willing to take risks with their business? and, are risk-loving accountants more likely to be innovative? Using new survey data from UK accountancy practices, we find that accountants that have an appetite for risk are significantly more likely to be innovative in both their internal processes and practices as well as externally through the development of new products, services, and markets. Further, we find that the perception of increased market competition/turbulence negatively affects product and service innovations, but not process, managerial and marketing innovations of accountancy firms.

Keywords: Risk; Innovation; Accountancy; Competition

1. **Introduction**

The accountancy profession is not widely perceived to operate at the technological frontier, nor would it be widely considered a profession characterized by a huge appetite for risk and innovation (Glaveski, 2015). However, these perceptions, certainly in the context of technology adoption and new opportunities for innovation in services, have been shown to be contestable with a significant take-up of mainframe computers for auditing and time recording in the 1970s and the adoption of on-line micro-processors in the 1980s for management accounting (Barras & Swann, 1984; Barras, 1986). During the 1990s, the widespread use of computerized networks enabled accountants to support the full automation of auditing and accounting services, to expand output efficiencies (Menon & Williams, 2001) by reducing labor intensiveness (Elliott, 1998). This close alignment with new technologies continued into the 21st Century, with accountants engaging with what Raphael (2017, p.28) calls ‘breakthrough innovations in areas such as artificial intelligence (AI), workflow automation, and data analytics’ to eliminate tedious manual tasks and deliver new insights that were not feasible before. Yet, as with all innovation, there are leaders and laggards. Furthermore, with such disruptive technologies (e.g., AI, cloud computing), accountancy practices face risks such as non-compliance with accounting standards and/or regulations (e.g., Trompeter & Wright, 2010; Ma et al., 2021). These are in addition to the risk of accountancy practices failing to provide satisfactory services to their clients.

We argue that small and medium-sized accountancy practices (SMAPs), being relatively resource-constrained, would be particularly exposed to such risks. Also, it is posited that small accounting firms attempt to resolve their resource constraints by entering into strategic alliances (e.g., Nandan & Ciccotosto, 2014; Arslan, 2018). Notwithstanding, when they align themselves with other independent firms in an interorganizational relationship such as accounting network or association, they face competition (Bills et al., 2021). This is because although it enables sharing of resources such as best practice and expertise (Bills et al., 2021), member firms in the network are also typically competitors (Arslan, 2018), competing for clients and human capital in the marketplace. This competitive aspect of the relationship encourages uncooperative and opportunistic behavior (Bills et al., 2021). Therefore, it could be argued that although an accounting network could ease the resource constraints of member firms, it may not facilitate innovation.

Some studies around risk-taking and innovation have been conducted in the context of industries such as technology (e.g., Chesbrough & Rosenbloom, 2002; Brettel & Cleven, 2011); public services (e.g., Brown & Osborne 2013); Telecommunication and aerospace (e.g., Berglund, 2007); Chinese listed firms (e.g., Zhang et al., 2018; Shahzad et al., 2019) and ceramic industry (Garcia-Granero et al., 2015). However, the paucity of relevant studies in professional services, specifically around accountancy firms, is glaring. This is surprising because accountancy firms do not only have to interpret and evaluate the implementation of accounting standards, but they also have to interpret and apply tax laws that are enforceable within the national boundaries in which they operate. These are in addition to other authority such as auditing standards that accountancy firms must comply with. Failure to comply could result in financial and reputational consequences for the firm. Furthermore, even if these firms adhere to existing standards and laws/legislation, client satisfaction is not guaranteed, considering the importance of the rapport between the engagement partner and the client. Although such rapport could also be relevant to other consultancy firms, such firms do not have to adhere to specific (accounting/auditing) standards and tax legislation. This suggests greater requirements for SMAPs to satisfy and retain clients. This also suggests that accountancy firms are exposed to risks that are not usually faced by firms in other industries. Thus, cognizant of the importance of risk and innovation to accountants, and of the importance of professional accountancy services to the functioning of other businesses in the economy, this study aims to fill the gap in the literature.

We posit that risk tolerance is at the heart of explaining why some accountancy practices are continually seeking to innovate both in terms of their internal processes and technology adoption, as well as their outward market facing activities, while some choose to do nothing. Risk tolerance of practitioners could be improved by greater understanding of their internal and external business environments. This is because knowledge prevents a leap in the dark and mitigates risk. Therefore, we suggest that the risk tolerance of practitioners could be altered if they equip themselves with relevant knowledge. This leads us into a wider context in which risk, investment, and innovation are intrinsically linked. With all investments, particularly those involving innovation, there is an element of risk in terms of the potential distribution of outcomes (Wu et al., 2005; Ling et al., 2008). For this reason, Martin (1981) contends that many economic decisions by accountants are made under conditions of incomplete knowledge, creating risk and uncertainty. This risk factor is particularly important for two reasons. First, most investments of time and/or money have an element that is sunk (non-recoverable), which is problematic if there is a ‘bad’ outcome (Cabral, 1995; De Falco & Renzi, 2015; Tavassoli & Karlsson, 2015). Second, for a given risk distribution, different types of people have a higher tolerance, or willingness, to accept a given level of risk (Tom et al., 2007; Croce et al., 2020). It is therefore our intention in this paper to address two basic research questions, within the context of the accountancy profession:

* *What factors are associated with a willingness of an accountancy firm to accept higher (lower) levels of risk?*
* *Is risk tolerance in accountancy firms associated with higher levels of business innovation?*

We empirically tackle these two research questions using a recent survey of UK accountancy practices. In doing so, we hope to advance our understanding of how accountancy practices approach innovation across four modes, namely process, managerial, product or service, and marketing, and establish precisely what role risk tolerance plays in this decision. The importance of SMAPs to the economy cannot be overstated. This is because they provide customized business support services to SMEs across industries that make immense contribution to job creation and employment, in addition to being financial advisers of choice for these SMEs (Schizas et al., 2012) across various economies. Yet, the dynamic business environment and increased competition from the larger accountancy firms require that SMAPs be innovative if they are to survive and continue to satisfactorily serve the changing needs of their SME clients. Also, because the innovation process is an uncertain path, it requires risk-taking. However, in investigating the role of external auditor in a technological environment, Caringe and Holm (2017) posit that the increased information environment reduces the external auditor’s monitoring role. This underscores the importance of understanding the relationship between risk-taking and innovation in SMAPs; hence, this study.

Our results show that SMAPs were fairly tolerant of risk, but that this was strongest for larger and younger firms. On the association between risk tolerance and innovation, we document positive and significant association across all four-innovation modes. In summary, we are able to characterize the accountancy firm population as one that is willing to take risks. This study makes the following contributions to extant literature: First, there is stronger risk tolerance for larger accountancy firms than the smaller ones, with a stronger magnitude change between micro and small firms. This could be linked to the increased managerial innovation associated with the increased size of the accountancy firm. Second, there is a significant relationship between risk-tolerance and the four modes of innovation, however, the relationship is stronger with managerial and process innovation but smallest with product/service innovation. Third, the perception of increased market competition/turbulence has a negative significant association with product and service innovations, but not with process, managerial and marketing innovations of accountancy firms.

The remainder of this paper is organized as follows. In section 2 we present the literature review, and develop our hypotheses in section 3. In section 4 we present and discuss our core data which we use to empirically estimate the relationships in section 5. Section 6 discusses our results. Our conclusions are presented in section 7.

1. **Literature Review**

Here, we review the empirical literature relating to innovation and risk. This is important, as attitudes toward risk taking have been central to the development of theories of finance and investment and managerial decision-making (e.g., Cyert & March, 1963; Kahneman & Tversky, 1979; Wernerfelt, 1984; Covin & Slevin, 1991). In finance and investment theory, risk has been viewed as relating to variance in the distribution of outcomes since the seminal work of Knight (1921). Hence, observed investment is fundamentally shaped by an investor’s willingness to accept a given level of risk. It follows that in managerial decision-making, risk is also shaped by the potential consequences that result from a ‘bad’ outcome associated with project failure and/or loss of invested capital (Wu, 2008). Similarly, Helliar et al. (2002) contend that risk is associated with negative outcome of events affecting the manager’s/accountant’s functional areas of control.

* 1. **Risk and innovation in firms**

Adequate work environment, generally based on flexible managerial practices that foster an innovative culture (Caldwell & O’Reilly, 2003) is most important for successful innovation-oriented businesses (Keizer & Halman, 2007; Molina-Moraes et al., 2011). Therefore, although risk is an important conceptualization linked to other important notions including trust, blame, culture and governance (Woods et al., 2016), a perceived climate that is favorable to risk-taking facilitates the integration of risky behaviors from which the firm’s overall innovation performance benefits (Hood & Koberg, 1991; Garcia-Granero et al., 2015). Also, it is argued that because managerial risk-taking propensity is positively related to the firm’s risk-taking climate, which improves innovation performance, firms with managers that can project their risk-taking tendency on all levels of the organization are capable of outperforming other firms (Garcia-Granero et al., 2015). This implies that the practical flexibility shown e.g., by encouraging small-scale development projects or encouraging gradual improvements of greater innovation process of a specific unit, broadens the innovation risks and feasible opportunities in corporate innovation, to the benefit of organizational innovativeness (Berglund, 2007).

Whilst risk assessment has historically been essential to areas of both management and financial accounting, considerations of risks are fundamental to financial reporting, investment appraisal, budgeting, and audit planning (Woods et al., 2016). Although the expectation is for senior/top management to lead in both risk management and innovation, a risk management system that is inappropriately constructed can inhibit risk-taking and stifle innovation (Gurd & Helliar, 2017). For accountancy practices, like other firms, risk and uncertainty in decision-making result from incomplete knowledge in environmental factors to which the firm is exposed. Also, an accountancy firm as a business is also subject to entrepreneurial risks and pressures. Furthermore, because risk inversely varies with knowledge (Fisher, 1930), the unequitable distribution of knowledge across accounting firms (even of similar size) implies that risk taking increases for those with inadequate knowledge in factors that affect relevant decision making.

While creativity and innovation in the bigger accountancy firms are demonstrated by partners, with managers/supervisors and other senior staff assessed more on the basis of compliance and production (Hook & Koberg, 1991), the smaller accountancy firms are characterized by the absence of middle management. This suggests that in smaller accountancy firms, creativity and innovation are usually the responsibilities of an individual or a few individuals who make up the single management layer. Therefore, in these firms, corporate governance mechanisms may not be dependent on stakeholders’ interests to the extent suggested by Kovermann and Velte (2019) such as alignment between management and shareholders.

With respect to the adoption of cloud computing by SMAPs, Ma et al. (2021) suggest that an interorganizational perspective is necessitated by a triadic relationship between SMAPs, their clients and cloud computing providers (also see Rudansky-Kloppers & Van den Bergh, 2019). A priori, we argue that, internationally, this interorganizational perspective is multidimensional (i.e., goes beyond the triadic relationship) considering the additional need for regulatory compliance. Underpinning this multidimensionality is the degree of uncertainty (in expected benefits) and the risk appetite of the management of the accounting firm. Caldeira and Ward (2003) contend that factors that have been most successful in adopting IS/IT are development of organizational competences and management attitude and perspective with respect to IS/IT. For instance, it is argued that decisions to adopt management accounting innovation and change is a function of rational decision-making process and institutional pressures as well as the attributes of individuals who make the final decisions (e.g., Naranjo-Gil et al., 2009). Therefore, Naranjo-Gil (2009) suggests that adopters of administrative and technical innovations are less sensitive to organizational factors than to environmental factors.

Furthermore, the introduction of cloud computing represents a significant disruptive technology for the accounting industry. Considering its disruptive nature, Ma et al. (2021) posit that the adoption of cloud computing by SMAPs has been influenced by factors including organizational readiness (client readiness and IT sophistication), perceived benefits of cloud-based client computing and client and competitive pressure (external pressure) (also see Caldeira & Ward, 2003; Naranjo-Gil, 2009). Rudansky-Kloppers and Van den Bergh (2019) argue that because accounting firms have already invested in technology (that are becoming redundant), they are reluctant to invest in new technology. Also, some firms have invested in big data analytics tools (e.g., Inflo, Alteryx and CaseWare) to facilitate the audit process (e.g., Tiberius & Hirth, 2019), especially in identifying audit risks and in conducting audit tests such as journal testing. Notwithstanding the expected efficiency gains from adoption of technology, the need to provide additional services while complying with statutory requirements remains paramount. This implies that adoption of technology by SMAPs must ensure innovation in market, product, and service delivery (Hegazy et al., 2017) while maintaining statutory compliance. This is in addition to the fact that implementation and diffusion of regulatory technology is characterized by complexity (e.g., Ma et al., 2021).

1. **Hypotheses development**

The following paragraphs set out our testable hypotheses that are developed as extension of extant literature as discussed in the preceding section.

* 1. **Firm size and risk tolerance**

Generally, innovation is a difficult activity especially for organizations with limited resources and inadequate experience (Hadjimanolis, 1999), considering it involves risk-taking. This is because large firms (larger SMEs) have innovatory advantages that include relatively large financial and qualified human resources, extended external scientific and technological networks (Rothwell & Dodgson, 1991). This implies that in the event of unsuccessful innovation (i.e., risk materializes), these firms often have capacity (resources) to absorb the resulting impact. Rothwell and Dodgson (1991) argue that this is not the case for SMEs (smaller SMEs). This suggests that larger firms are likely to be more risk-tolerant than smaller firms.

The use of digitization and artificial intelligence (AI) is ramping up across industries (Tiberius & Hirth, 2019). Although some of the larger accounting firms have made in-roads, accounting firms using AI are exposed to the risk of inaccurate results as well as the risk of noncompliance with accounting standards and/or other regulations (e.g., Trompeter & Wright, 2010). Although the implication is that accounting firms that are risk-tolerant would want to implement AI, and those that are risk-averse would not, management would also have to consider the adequacy of resources within the firm. SMAPs and their clients are resource-constrained (e.g., Ma et al., 2021) and, therefore, face the additional risk of diverting limited resources to invest in this technology. For instance, by implementing technology and automation throughout the audit process, the time and effort constraints can be reduced (Elliott, 1998) and production efficiencies increased (Menon & Williams, 2001). However, such efficiency gains could be outweighed by the consequences of noncompliance and the inappropriate audit opinion that would result from inaccurate results. Also, while technology facilitates continuous auditing and the development of real time assurance, the cost involved requires prudence in its implementation in high-risk business process, and lower risk business processes in the regular audit cycles (Chan & Vasarhelvi, 2011). We submit that while the cost involved requires accounting firms to have adequate resources for technology implementation, prudence requires a degree of risk-tolerance. Furthermore, Pathak et al. (2005) suggest that a continuous audit cycle that is dependent on transaction volume (e.g., number of account receivables transactions recorded in the accounting system) could be more cost-effective. This implies that management must have the resources and assume not only the risk of investing in new technology, but also that of the business process in which to invest if the firm is to benefit from cost reduction in service provision. Thus, based on the foregoing arguments, we hypothesize that:

*H1a: Larger accountancy firms will be more risk tolerant.*

* 1. **Firm age and risk tolerance**

In early than decline stage of the firm life cycle, firms might be more in need of risky investment for the purpose of expansion (Shahzad et al., 2019), especially as management’s optimism supports early investments to prevent competitors from entering the market (Jovanovic, 1982). This implies that firms are more risk-tolerant during the early stages of their cycle. For instance, the willingness of young firms to borrow relative to older firms is increased by the likelihood of a very successful start-up, although the greater possibility of failure decreases financial institutions’ willingness to lend to young firms (Brown, 1997; Collier et al., 2016). Also, firm age, not size, is important in explaining job creation (Adelino et al., 2017). We contend that job creation results when risk-tolerant accounting firms (and other firms) venture into new markets, products and/or services.

Furthermore, it is argued that a firm is more likely to commence growth-orientation and make larger investments during its early years than at its mature stage (Wernerfelt, 1984) because the relative increase in outdatedness at the mature stage encourages management to reduce investment (Jovanovic, 1982). It could be argued that this reduced investment at the mature stage results from a decreased appetite for risk-taking by management at the mature stage of the firm’s lifecycle. Additionally, as firms age, management limit their exploratory search behavior (Lavie & Rosenkopf, 2006; Ambilichu et al., 2023) as they become more comfortable with sticking to established routines (Nelson & Winter, 1982). While this strengthens the view that firm age is an important signal of organizational inertia (e.g., Bierly & Daly, 2007), it also demonstrates that older firms are less risk tolerant. Thus, we hypothesize as follows:

*H1b: Younger accountancy firms will be more risk tolerant.*

* 1. **Risk tolerance and innovation**

Some accounting firms focus on accounting services innovation with digitization, creating higher value accounting products and services which produce improved market performance and competitive advantage (e.g., Nylén & Holmström, 2015). For firms whose survival (and possibly the personal assets of the entrepreneur) could be threatened by a major unsuccessful product or process development, the risk of getting it wrong attracts specific attention, resulting in a characteristic and understandable risk aversion (Brown, 1997). Also, by demonstrating the desire to pursue opportunities that are external to the firm, the manager’s risk-taking facilitates the identification and advancement of activities that contribute to achieving the long-term objectives of the firm (Faccio et al., 2011). This suggests that risk-taking managers (including directors/partners of accountancy practices) are more tolerant to innovation risk and uncertainty, and more confident in successful completion of innovative projects (Simon & Houghton, 2003). Therefore, in responding to changes in the business environment, the introduction of novel technologies and acquisition of new knowledge for the firm’s innovation activities are likely to be made by risk-taking managers (Brettel & Cleven, 2011).

The strategic decision-making by managers in uncertain environments (Richard et al., 2004) is risk-taking – an important factor in innovation decisions, - with significant and long-term effect on firm performance and development (Li & Tang 2010). Also, it is argued that managers’ risk-taking reflects a firm’s risk-taking inclination (Zhang et al. 2018), considering they have the ultimate responsibility for the allocation of resources relating to the firm’s innovation activities (Balkin et al., 2000). This contributes to enhancing the innovation performance of the firm. For instance, some SMAPs have implemented management accounting system (MAS) to improve internal efficiency and to provide non-accounting services to clients. Such services include business planning (e.g., Pasch, 2019), budgeting, identification of key performance indicators (KPIs) and performance measurement (e.g., Alsaid & Ambilichu, 2021, 2023). This could also be the case with the use of tax planning software. In this regard, it is argued that the use of MAS to focus attention and decision-making relates positively to exploratory innovation (e.g., Pasch, 2019). Therefore, we hypothesize as follows:

*H2: The firm’s risk tolerance will be positively associated with its innovation.*

1. **Data and Methodology**

Here, we present our sample demographics and discuss our data collection methodology. The questionnaire was designed, pre-tested, and then piloted with 10 accountancy practices, and was completed by the partner or director of each sample accountancy firm. The questionnaire was initially distributed to the partners/directors of fifty-seven firms (SMAPs) in attendance at a SMAPs conference[[1]](#footnote-1) in Birmingham (UK), organized by 2020 Innovation. Twenty-eight forms (questionnaire) were returned, twenty-five of which were complete and three incomplete. These 57 firms were then eliminated from the sampling frame, to ensure that the sample selected did not include any of these firms.

The SIC[[2]](#footnote-2) code (69201) of economic activities for accounting and auditing activities was used to identify the population of accountancy firms registered for business in the UK. The total listing was obtained from the FAME database. Accountancy firms with annual income exceeding the SME threshold[[3]](#footnote-3) were identified from data published by Accountancy Age, corroborated with data published by the UK Companies House, and eliminated from the sampling frame. Also, as indicated earlier, the accountancy firms that attended the accountancy practices conference (in Birmingham, UK) were also identified and removed from the sampling frame. The sample was selected by a random sampling procedure (see Ambilichu et al., 2023).

The postal survey and covering letter were addressed and mailed directly to the partner/director of 1460 accountancy practices across England, Scotland, Wales and Northern Ireland over a three-month period in 2016. Ten questionnaires were returned due to incorrect postal address. Two hundred and ninety-eight completed questionnaires were received giving a response rate of 20.41%. A total of 326 surveys were completed (298 postal and 28 completed at the small- and medium-sized accountancy practices conference in Birmingham). However, after analysis of missing data, there were 315 useable responses, giving an effective response rate of 20.8%. The key variables for analysis are described in Table 1. Each variable (except firm age, firm size, and accountancy body) is ordered on a 7-point Likert scale, where 1 = strongly disagree with the statement and 7 = strongly agree with the statement. In addition, we find that 47.0% of firms are members of the Institute of Chartered Accountants of England and Wales (ICAEW), 28.6% members of the Association of Chartered Certified Accountants (ACCA), and 24.4% members of the Institute of Chartered Accountants of Scotland (ICAS) or the Institute of Chartered accountants in Ireland (ICAI). On the age distribution of firms, we find that 25.7% are younger than eleven years, 19.4% between 11 and 20 years old, and 54.9% more than 20 years old. In total 64.1% of firms were classed as micro businesses (<10 employees), 27.9% as small businesses (10-49 employees) and 7.9% as medium-sized businesses (>=50 employees). These firm demographics suggest that the population of small and medium-sized accountancy practices (SMAPs) in the UK is characterized by very well-established micro businesses.

**4.1 Measures**

*4.1.1. Independent variables*

*Firm size:* Firm size is determined by measuring the total number of employees in a SMAP. Firm size is expected to affect risk tolerance (see e.g., Zhu et al., 2012). *Firm Age:* Risk taking in older firms could be impacted by inertia (e.g., Bierly & Daly, 2007). For firm age, we consider the number of years of existence of a SMAP.

*4.1.2. Endogenous variable*

*Risk tolerance*: We operationalized risk tolerance by adapting a validated scale from Wang and Ahmed (2004).

*4.1.3. Dependent variable*

*Innovation:* In the accountancy practice industry, innovation is not simply the development of new products and services but also the introduction of new processes and going into new markets. Therefore, we adapted items for process, managerial, product and market innovation from Messeghem (2003) and Wang and Ahmed (2004).

*4.1.4. Control variables*

*Market competition (MC):* A firm’s constructive balance between exploring/attempting new innovations and exploiting/capitalizing on existing routines would vary depending on the environmental conditions (dynamism, competition) it faces (see e.g., Caspin-Wagner et al., 2012). Therefore, respondents were asked to indicate their perception of intensity of competition in the industry (as adapted from DeSarbo et al., 2005).

*Technology:* Innovation in firms could be influenced by the adoption of technology. Therefore, we control for the effect of technology on innovation in accountancy firms.

*Accountancy body (AB):* In the UK, accounting firms are required to be registered with one of the accountancy bodies. Although all accounting firms are in business to provide business support services, the accountancy bodies have varied requirements. For instance, the training required to qualify for full membership and requirement for continuous professional development (CPD) differ between accountancy bodies. We argue that risk-taking and innovation in accounting firms could be affected by such subtle differences.

*Firm size and firm age:* Resource constraints may limit innovation in smaller firms. Therefore, we equally control for the effect of firm size on innovation. Firm age could impact innovation. Thus, we also control for the effect of firm age on innovation.

The measurements used for the variables are shown in Table 1.

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Insert Table 1 about here.

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Here we present and describe the key variables that form the basis of our subsequent multivariate analysis. Researchers in previous studies have submitted that single-item measures reveal adequate reliability, convergent validity and good predictive validity and sensitivity (see e.g., Christophersen & Konradt, 2011; Fisher et al., 2016; Matthews et al., 2022). This validates our use of single measures. Moreover, although we use four measures of innovation, greater granularity is provided as each measure captures a stream of innovation. Also, while we use the full 7-point Likert scale responses in the regression models, we combined the scores as follows: 1-3 = low, 4 (midpoint) = moderate, and 5-7 = high in the descriptive statistics for brevity. See e.g., Chyung et al. (2017). Panel A1 and Panel A2 (Table 2) show how competitive the firms’ external environment is. We observe that 52.4% of firms operate in a highly competitive market environment. A further 43.2% of firms operate in a moderately competitive environment. Only 4.4% of firms operate in a low competition environment. These findings are important as they suggest the need for innovativeness in accountancy firms if they are to remain competitive in the dynamic business environment.

Table 2 (Panel A2) also reports on attitudes to taking risk, which is a key feature of investing in innovation. Here we find that 41.6% of firms are very tolerant of risk-taking behaviors. A further 45.4% were moderately tolerant of risk, and only 13.0% adopted a risk-averse attitude. This strengthens the case for rejecting the view that accountants/finance managers are risk-averse (e.g., Tyler & Steensma 1995) and suggests that the majority are willing to tolerate moderate or high levels of risk. With such level of risk-taking, it could be suggested that accountants are shifting towards the concept of entrepreneurship.

Building on the body of work regarding the adoption of new technologies in accountancy (Barras, 1986; Raphael, 2017), Table 2 (Panel A2) further shows that this is borne out in our data. More than six in ten firms have a high level of adoption of new technologies, and a further three in ten a moderate level of technology adoption. In contrast, only five in a hundred accountancy practices have a low take-up of new technologies. Again, this strengthens the entrepreneurial aspects of ownership of small accountancy firms and the adoption of new technologies to strengthen their competitiveness and create new streams of business.

Innovation can take many forms and can have an internal or external focus. Panel B1 and Panel B2 (Table 2) show firms’ adoption rates for four different modes of innovation including process, managerial, product/service and marketing. Here we find high adoption rates for process and product/service level innovations, and relatively low adoption rates for marketing innovations. Taken together, our findings suggest that there is a willingness on the part of accountancy firms to engage with most modes of innovation at least on a moderate level. Marketing, which is generally a strength in small businesses, is the one area where accountants appear to be less willing to engage with and this may relate to a lack of capability in this specific managerial function, and a professional ethics of cautious attitude in marketing accountancy services.

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Insert Table 2 about here.

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Having explored our key dependent and independent variables, we now turn our attention to our multivariate analysis. We are interested in establishing whether key associations exist between risk and innovation. In this respect, we adopt two strands of analysis. Firstly, we estimate a model for a firms’ risk tolerance corresponding to H1a and H1b. Here the dependent variable is ordered and categorical (low, moderate, high). We estimate this model using core firm variables (e.g., age, size, and membership of accountancy bodies) on the right-hand-side. Then we estimate four separate models for innovation modes. Here the key right-hand-side variable is our risk tolerance variable, and this corresponds to H2. We also include our core firms’ variables (age, size, and membership of accountancy bodies).

As all four of our dependent variables (risk tolerance, process innovation, managerial innovation, product/service innovation, and marketing innovation) are ordered and categorical, we estimate these models by ordered probit. In ordered probit, the underlying score is estimated as a linear function of the independent variables and a set of cut-points. The probability of observing outcome *i* corresponds to the probability that the estimated linear function, plus random error, is within the range of the cut-points estimated for the outcome: Pr (outcomej = i) = Pr (κi−1 < β1*x*1j + β2x2j +···+ βkxkj + uj ≤ κi) uj is assumed to be normally distributed. In either case, we estimate the coefﬁcients β1, β2, ..., βk together with the cutpoints κ1, κ2, ..., κi−1, where *i* is the number of possible outcomes. κ0 is taken as −∞, and κi is taken as +∞. All of this is a direct generalization of the ordinary two-outcome probit model. See Table 4.

Prior to our core modelling, we also estimated an additional model to test for reverse causality, that innovation activity shapes a firm’s attitude to risk. We use the same core set of firm variables plus the innovation count measure. From this model the innovation count variable had a coefficient of 0.018 (t-stat = 0.010, Pr>t = 0.923) which implies that there is no significant association flowing from the scale of innovation activities and a firm’s attitude towards risk. We note that the raw correlation between risk and our four modes of innovation (Table 3) show positive correlations between risk and all modes of innovation although the correlation is highest for marketing innovation and lowest for managerial innovation. We also note that within innovation mode, the highest correlation is between product/service innovations and marketing innovations.

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Insert Table 3 about here.

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1. **Results**

Our first model (Model 1, see Table 4) estimates risk tolerance. We find clear evidence that firm size and age both have associations with willingness to tolerate risk. On firm size, we find that there is a large and significant association with risk tolerance as we move from micro to small accountancy firms, and then to medium-sized accountancy firms. The step change is at its greatest between micro and small accountancy firms. This result is supportive of H1a. On age of firm, we find a negative association with risk tolerance but only for the very oldest class of firms (>20 years old). This evidence is supportive of H1b. Model 3 reports our findings for managerial innovation. Our key findings here are that risk tolerance has a positive and significant association with the adoption of process and managerial innovations. This offers support for H2 and confirms a link between risk and innovation.

Consistent with our results for risk and innovation in respect of process and managerial innovation, we also establish a positive association between risk tolerance and product/service innovation. In this instance, the magnitude of the association was much smaller. Our fourth innovation mode (model 5) was the adoption of marketing innovations. We established earlier that this was the innovation mode with the lowest levels of engagement by accountancy practices. Importantly, we reconfirm our previous findings in relation to risk tolerance and innovation adoption, with a clear and positive association between risk and the adoption of marketing innovations. Table 4 provides our key empirical findings.

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Insert Table 4 about here

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*5.1. Effects of control variables*

Regarding process innovation (model 2), we find that firm size has a positive association, but only for medium-sized accountancy firms. For age of firm, we find that our middle age class (11-20 years) of firms had a negative association with process innovation, as did our oldest class of firms although the latter association was smaller in magnitude. The size – managerial innovation association (model 3) was much clearer in this instance with an increasingly positive association as we progress through the firm size classes. For age of firm, the general association was negative for managerial innovation. It was also the case that the negative association was of greater magnitude for 11-20 year old firms than for firms >20 years old. In model 4, for age of firm, we find that our middle age class (11-20 years) of firms had a negative association with product/service innovation, but the magnitude was less for our oldest class of firms. On size of firm (model 5), we find a positive association, but only for medium-sized firms. In relation to firm age, here we find no significant association.

Furthermore, in model 1, we find that market competition has a positive significant association with risk tolerance, but membership of different accountancy bodies does not. In model 2, market competition does not have a significant association with a firms’ adoption of new processes; however, accountancy body membership has a positive significant association. We find, in model 3, that membership of professional bodies and market competition were not associated with managerial innovation adoption. Model 4 shows that accountancy body does not have a significant association with product/service innovation while competition has a negative significant association. Furthermore, accountancy body has a positive significant association with marketing innovation whereas competition does not (model 5). Finally, technology (new tech adoption policy) has positive significant correlation across all four innovation modes (models 2, 3, 4, & 5). These results are shown in Table 4.

1. **Discussion**

We found largely supportive evidence of a positive association between firm size and willingness to tolerate risk. The positive significant association might suggest that the larger accountancy firms (relatively resource rich) are able to adopt a more risk-tolerant attitude as the consequences of a ‘bad’ outcome (e.g., De Falco & Renzi, 2015; Tavassoli & Karlsson, 2015) from risky behaviors may not be as critical. Such risk-tolerance could be the result of accounting professionals’ desire to move from the traditional methods employed in executing their mandatory and routine functions (see Guthrie & Parker, 2016). For instance, some resource rich accountancy firms have taken risk to implement automation throughout the audit process (Elliott, 1998) to facilitate continuous auditing and develop real time assurance (Chan & Vasarhelvi, 2011).

We find supportive evidence that the association between firm age and risk tolerance is negative, but only really clear-cut evidence for our very oldest class of very well-established firms. In short, younger firms are more risk-loving and dynamic than older firms where the appetite for risk is often quashed by formalized routines and procedures. The negative association between firm age and risk tolerance is consistent with the loss of entrepreneurial dynamism as firms’ age and a shift to a more structured and formalized, and bureaucratic, management structure (Battisti & Deakins, 2017).

Our core hypothesis, that risk tolerance is positively associated with innovation, was empirically supported across all four innovation modes, although the association was strongest for process innovation and weakest for product/service innovation. This result supports Faccio et al. (2011) who posit that identification and advancement of activities that contribute to achieving the long-term objectives of the firm are facilitated by the manager’s (accountant’s) risk-taking. Such managers/accountants are more tolerant to innovation risk, with greater confidence in successful completion of innovation projects (e.g., Simon & Houghton, 2003; Hiebl et al., 2017; Weigel et al., 2023), a foundation for managerial innovation. This is important for process, product, and service innovation by SMAPS. We suggest that this is akin to the passionate interest of owners-managers as a driver of innovation in SMAPs (see e.g., Carlsson-Wall et al., 2020).

Furthermore, we find that risk tolerance has a positive and significant association with the adoption of process and managerial innovations. This finding is consistent with Naranjo-Gil et al. (2009) who argue that adoption of MAS innovation and change is a function of rational decision-making process and institutional pressures. It is also consistent with Pasch’s (2019) view that adoption of MAS to focus on decision-making is an aspect of exploratory innovation.

We find that the firm size – managerial innovation association was increasingly positive as we progress through the firm size classes. Although this finding is consistent with Hadjimanolis’s (1999) view that resource-strapped firms are limited in innovation. In model 4, for age of firm, we find that our middle age class (11-20 years) of firms had a negative association with product/service innovation but not our oldest class of firms. Our finding here is not consistent with Lavie and Rosenkopf (2006) and Shahzad et al. (2019) who argue that management exploratory behavior is limited as firm age. Our finding is also not consistent with Nelson and Winter’s (1982) view that management in older firms are more comfortable with maintaining established routines. Therefore, our finding portrays the unique nature of the accountancy industry and specifically of small and medium-sized accountancy firms as business entities. We make a contribution in this regard. Although the marketing activities of accountancy firms may be restricted by the professional bodies on ethical grounds, our finding of limited marketing innovation suggests that resource constraints rather than firm age could hinder the marketing innovation of smaller accountancy firms.

Our finding that market competition has a positive significant association with risk tolerance suggests that an increase in market competition requires SMAPs to be more risk tolerant. This relative increase in risk-tolerance, it could be argued, is important for practitioners in the UK where the smaller accountancy firms are facing increased competition from their larger counterparts. Additionally, membership of different accountancy bodies is not associated with risk tolerance considering accountancy firms, irrespective of accountancy body membership, operate within the same national economy and face the same macro-economic condition. This is same for managerial innovation considering the similarity in the knowledge base of accountancy bodies and their accountants. We argue that this non association with risk tolerance could also explain the non-significant association of accountancy body membership with product/service innovation we identified (model 4).

Furthermore, we identified that market competition does not have a significant association with a firms’ adoption of new processes, managerial and marketing innovations (models 2, 3, &5). This is contrary to the expectation that with increased competition, small and medium-sized accountancy firms would adopt innovative processes considering it could lead to increased efficiency, reduced operating costs and increased profit. This is an interesting finding that merits attention in future research. Also, our finding that accountancy body membership has a positive significant association with adoption of new processes and marketing innovations are interesting. This could have resulted from the fact that although the curriculum of the UK accountancy bodies may be similar, they have differences in other requirements such as experience required for full membership and continuous professional development (CPD). Future research could investigate the effect of these differences. Finally, the positive significant effect of technology suggests that adoption of a technology-oriented policy drives innovation in accountancy firms.

1. **Conclusion**

We began by questioning whether the well-established link between a firm’s willingness to tolerate risk and innovation held in the unique context of accountancy firms. As an important first step in this exploration, we sought to establish what types of accountancy firms were more (less) risk tolerant. In general, we found that accountancy firms were fairly tolerant of risk, but that this was strongest for larger and younger firms. Then we tested for any associations between risk tolerance and innovation across four different modes. We found clear and significant results in all four cases with risk and innovation having a positive association. These results suggest that risk-taking is a key antecedent of innovation in small and medium-sized accounting firms.

Taken as a whole, we are able to characterize the small and medium-sized accountancy firm population as one that is willing to take risks and adopt new technologies. These are typical features that lend themselves to the adoption of innovative practices across different internal and external facing modes. This was confirmed by our consistent finding that high levels of technology adoption were positively associated with innovation across all modes. That is not to say that the availability of financial and human capital resources is not important, as evidenced by the strong medium-sized accountancy firm association with innovation adoption. Equally, there is also evidence that older firms have a tendency to adopt a more cautious and conservative approach to innovation and this is consistent with a loss of dynamism.

However, our results do suggest that SMAPs may need to pay more attention to their marketing strategy that, in relative terms, has been neglected. The lack of innovation in marketing could have resulted from the restriction on the marketing and advertising activities of these firms, imposed by the various accountancy bodies to which the firms are members. This is different for firms in manufacturing which derive a higher marketing capital from engaging with their distribution networks and connection with critical stakeholders (Llach & Nordqvist, 2010).

In sum, we find clear and supportive evidence that a willingness to accept risk is associated with an increased focus on internal and external modes of innovation. Yet this willingness is less pronounced in the very smallest and oldest accountancy practices, and this might suggest that in the long-run they may be at a disadvantage when competing with innovating firms. However, across the industry as a whole there is an appetite for risk and innovation, and this confirms and adds further support to the earlier literature regarding the very positive attitude of accountancy firms to adopting new innovation and technologies. Our study makes both theoretical and practical contributions.

*7.1. Theoretical implications*

Our study shows a stronger risk tolerance for larger accountancy firms than the smaller ones, with a stronger magnitude change between micro and small firms. This could be linked to the increased managerial innovation associated with the increased size of the accountancy firm seen in our result. Our finding sheds light on the resource-based view of the firm (Barney, 1991; Weigel & Hiebl, 2022) and supports Hadjimanolis’s (1999) position that innovation is difficult for (accountancy) firms with inadequate experience and limited resources. Therefore, our result suggests a significant connection between resource-base, risk-tolerance, and managerial innovation of SMAPs. Furthermore, our results show that although there is a significant relationship between risk-tolerance and the four modes of innovation, the relationship is stronger with managerial and process innovation but smallest with product/service innovation. This contributes in enhancing understanding of the risk tolerance – innovation relationship.

Furthermore, we show that the perception of increased market competition/turbulence has a negative significant association with product and service innovations, but not with process, managerial and marketing innovations of accountancy firms. This is important because it suggests that the product/service innovativeness of SMAPs is reduced with perceived increase in competition. This could be due to difficulty in ascertaining the specific outcome of new product/service offering (see e.g., Berglund, 2007). The expectation is that firms facing increased competition would deploy dynamic capabilities (e.g., Teece et al., 1997) and adopt an innovative posture to remain competitive in the dynamic or turbulent market environment. We are not aware of previous studies that have captured the effect of competition on the different modes of innovation in accountancy firms.

*7.2. Practical implications*

Our finding demonstrates that middle age accountancy firms are more risk tolerant than their older counterparts. This suggests that resource constraint rather than firm age could hinder the marketing innovation of smaller accountancy firms. Therefore, considering the importance of marketing innovation as antecedent to growth, management of SMAPs should seek to secure/allocate more resources if the firm is to become more risk tolerant and be more innovative especially in marketing its products and services.

Our study is not without some limitations. The cross-sectional nature of the data may become problematic with change of the data over time. In this regard, future research using longitudinal data could investigate whether the associations identified in this study vary over time. Also, as our study is focused on a single industry, caution should be taken in extrapolating the results to other industries/sectors. Therefore, future studies could investigate risk and innovation in other small and medium-sized professional services firms. Additionally, future research could also investigate the connections between managerial/entrepreneurial characteristics (including demographics of partners/directors), risk-taking, and risk management in SMEs (including accounting firms and other professional services firms). Additionally, if we assume that SMAPS are mostly family owned (see e.g., Llach & Nordqvist, 2010), the argument that innovation output is increased through risk-taking in nonfamily firms than in family ﬁrms (Craig et al., 2014) may not apply to accounting firms. However, because we did not explicitly capture the ownership structure of participating accountancy firms, this could be explored in future research.

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**Appendix**

**Table 1**

Variable description.

|  |  |
| --- | --- |
| Variable | Survey Question |
| Firm size | Select the size of your firm: [1-9 employees]; [10-49 employees]; [50-249 employees] |
| Market competition | The level of competition in our industry is extremely intense.  *(Adapted from Jaworski and Kohli, 1993)* |
| Risk tolerance | Senior management are willing to take risks to seize or explore various promisinggrowth opportunities.  *(Adapted from Wang and Ahmed, 2004)* |
| Technology | Our company’s policy is to adopt up-to-date technologies (e.g., most recent accounting software).  *(Adapted from Al-Ansaari, Bederr, and Chen 2015)* |
| Process innovation | Our firm constantly improves its operational and business processes.  *(Adapted from Wang and Ahmed, 2004)* |
| Managerial innovation | In the past three years, our firm has developed new management approaches and/or methods.  *(Adapted from Wang and Ahmed, 2004; Messeghem, 2003)* |
| Products/Services innovation | Our firm has introduced and marketed new services and/or products during the past three years.  *(Adapted from Wang and Ahmed, 2004)* |
| Marketing innovation | For our services or products, we develop marketing programs that are new in the market and/or industry.  *(Adapted from Wang and Ahmed, 2004)* |
| Firm age | Select the age range of your firm: [less than 11 years]; [11 – 20 years]; [greater than 20 years] |
| Accountancy body | Select the accountancy body to which your firm belongs: [ACCA]; [ICAEW]; [ICAS/ICAI] |

*Note:* The survey questions, except those relating to firm size, firm age, and accountancy body, were anchored on a 7-point Likert scale, where 1 = strongly disagree with the statement and 7 = strongly agree with the statement.

**Table 2:**

**Panel A1:** Key variables: Descriptive results/statistics of the 7-point Likert scale

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Likert scale | | | | | | |  |
| Key variables |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total (N) |
| Market competition | Number of firms | 2 | 12 | 35 | 29 | 72 | 129 | 36 | 315 |
| Risk tolerance | 5 | 36 | 28 | 38 | 77 | 95 | 36 | 315 |
| Technology | 3 | 13 | 18 | 17 | 66 | 112 | 86 | 315 |

**Panel A2:** Composition of key variables

|  |  |  |  |
| --- | --- | --- | --- |
|  | (% of Firms) | | |
|  | Low | Moderate | High |
| Market competition | 4.4 | 43.2 | 52.4 |
| Risk tolerance | 13 | 41.6 | 45.4 |
| Technology | 5 | 32.5 | 62.5 |

**Panel B1:** Innovation adoption: Descriptive results/statistics of the 7-point Likert scale (1 = strongly disagree; 7 = strongly agree)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Likert scale | | | | | | |  |
| Innovation adoption  (innovation mode)  variables |  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | Total (N) |
| Process | Number of firms | - | 8 | 12 | 48 | 100 | 106 | 41 | 315 |
| Managerial | 6 | 24 | 19 | 62 | 78 | 79 | 46 | 314 |
| Products/services | 10 | 45 | 15 | 33 | 64 | 100 | 48 | 315 |
| Marketing | 39 | 79 | 42 | 100 | 35 | 13 | 7 | 315 |

**Panel B2:** Innovation adoption by mode

|  |  |  |  |
| --- | --- | --- | --- |
| Innovation mode | Innovation adoption  (% of firms) | | |
|  | Low | Moderate | High |
| Process | 2.5 | 50.8 | 46.7 |
| Managerial | 9.8 | 50.5 | 39.7 |
| Products/Services | 17.5 | 35.6 | 46.9 |
| Marketing | 37.5 | 56.2 | 6.3 |

**Panel C:** Descriptive statistics – Firm size, firm age and accountancy body (One respondent per firm).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Firm size [by number of employees] | | |  |
| Variables | | Mean | Std. Deviation | 1-9 | 10-49 | 50-249 | Total (N) |
| Firm size | - | 1.44 | 0.637 | 202 | 88 | 25 | 315 |
| Firm age | =<10 years | 2.29 | 0.85 | 72 | 8 | 1 | 315 |
| 11 to 20 years | 46 | 13 | 2 |
| >20 years | 84 | 67 | 22 |
| Accountancy body | ICAEW | 1.77 | 0.816 | 77 | 54 | 17 | 315 |
| ACCA | 67 | 19 | 4 |
| ICAS/ICAI | 58 | 15 | 4 |

*Note:* Panel A1 and panel B1 show the descriptive statistics for the variables using the results of the 7-point Likert scale. Panel A2 and panel B2 show the grouping of the responses into three categories. Panel C presents the descriptive statistics for firm size, firm age and accountancy body.

**Table 3**

Pearson Correlations

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Mean | Std. Deviation | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **1.** Firm size | 1.44 | 0.637 | 1 |  |  |  |  |  |  |  |
| **2.** Market competition | 5.18 | 1.349 | 0.110 | 1 |  |  |  |  |  |  |
| **3.** Risk tolerance | 4.83 | 1.58 | .219\*\* | .253\*\* | 1 |  |  |  |  |  |
| **4.** Technology | 5.57 | 1.391 | .173\*\* | 0.102 | .327\*\* | 1 |  |  |  |  |
| **5.** Process innovation | 5.29 | 1.144 | .208\*\* | .132\* | .405\*\* | .413\*\* | 1 |  |  |  |
| **6.** Managerial innovation | 4.63 | 5.447 | 0.106 | 0.102 | .227\*\* | .148\*\* | .151\*\* | 1 |  |  |
| **7.** Products & services innovation | 4.87 | 1.734 | .240\*\* | 0.006 | .430\*\* | .306\*\* | .408\*\* | .112\* | 1 |  |
| **8.** Marketing innovation | 3.25 | 1.476 | .230\*\* | .122\* | .444\*\* | .311\*\* | .409\*\* | .170\*\* | .492\*\* | 1 |

**Note:**

\*\*. Correlation is significant at the 0.01 level (2-tailed).

\*. Correlation is significant at the 0.05 level (2-tailed).

**Table 4**

Full Estimates.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | | Model 5 | | |
|  | Risk Tolerance | | | Innovation: Process | | | Innovation: Managerial | | | Innovation: Products/Services | | | Innovation: Marketing | | |
|  | Coeff | S.E | Pr>z | Coeff | S.E | Pr>z | Coeff | S.E | Pr>z | Coeff | S.E | Pr>z | Coeff | S.E | Pr>z |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ***Accounting body ICAEW*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ACCA | -0.045 | 0.144 |  | **0.321** | 0.148 | \*\* | 0.107 | 0.146 |  | 0.205 | 0.147 |  | **0.287** | 0.146 | \*\* |
| ICAS/ICAI | -0.086 | 0.150 |  | 0.167 | 0.154 |  | -0.093 | 0.152 |  | -0.008 | 0.152 |  | 0.243 | 0.153 |  |
| ***Firm size (micro)*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Small | 0.511 | 0.144 | \*\*\* | 0.249 | 0.150 | \* | **0.287** | 0.148 | \*\* | **0.315** | 0.149 | \*\* | 0.225 | 0.146 |  |
| Medium | 0.757 | 0.235 | \*\*\* | **0.592** | 0.246 | \*\* | **0.793** | 0.246 | \*\*\* | **0.740** | 0.247 | \*\*\* | **0.626** | 0.239 | \*\*\* |
| ***Firm age (<11 years)*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 11-20 | -0.100 | 0.178 |  | **-0.619** | 0.183 | \*\*\* | **-0.750** | 0.183 | \*\*\* | **-0.565** | 0.180 | \*\*\* | -0.289 | 0.179 |  |
| >20 | -0.413 | 0.153 | \*\*\* | **-0.375** | 0.159 | \*\* | **-0.559** | 0.158 | \*\*\* | -0.274 | 0.156 | \* | -0.070 | 0.155 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Market competition | 0.180 | 0.044 | \*\*\* | 0.021 | 0.046 |  | -0.075 | 0.046 |  | **-0.096** | 0.046 | \*\* | -0.009 | 0.046 |  |
| Risk tolerance |  |  |  | **0.231** | 0.044 | \*\*\* | **0.291** | 0.044 | \*\*\* | **0.283** | 0.044 | \*\*\* | **0.286** | 0.044 | \*\*\* |
| Technology |  |  |  | **0.261** | 0.047 | \*\*\* | **0.298** | 0.047 | \*\*\* | **0.183** | 0.046 | \*\*\* | **0.158** | 0.047 | \*\*\* |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| cut 1 | -1.457 |  |  | 0.196 |  |  | -0.379 |  |  | -0.411 |  |  | 1.016 |  |  |
| cut 2 | -0.358 |  |  | 0.706 |  |  | 0.669 |  |  | 0.704 |  |  | 1.996 |  |  |
| cut 3 | 0.027 |  |  | 1.646 |  |  | 1.071 |  |  | 0.911 |  |  | 2.391 |  |  |
| cut 4 | 0.421 |  |  | 2.726 |  |  | 1.910 |  |  | 1.288 |  |  | 3.471 |  |  |
| cut 5 | 1.093 |  |  | 3.957 |  |  | 2.733 |  |  | 1.916 |  |  | 4.192 |  |  |
| cut 6 | 2.138 |  |  |  |  |  | 3.729 |  |  | 3.081 |  |  | 4.790 |  |  |
| LR | 68.34 |  |  | 111.30 |  |  | 149.10 |  |  | 109.30 |  |  | 96.71 |  |  |
| Pr>χ2 | 0.00001 |  |  | 0.00001 |  |  | 0.00001 |  |  | 0.00001 |  |  | 0.00001 |  |  |
| R2 | 0.036 |  |  | 0.118 |  |  | 0.137 |  |  | 0.099 |  |  | 0.090 |  |  |
| N Obs | 315 |  |  | 315 |  |  | 314 |  |  | 315 |  |  | 315 |  |  |

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

*Note:* The cut points evidence the regression model using the full 7-point Likert scale. The cut points are the coefficients of the model, and are interpreted as Pr(y=0) = Pr(Xb+u < \_cut1) = Pr(u < \_cut1-Xb) = F(\_cut1-Xb). Here, F**()** stands for the cumulative normal distribution. Here, F**()** stands for the cumulative normal distribution. The LR statistics for each model as well as the chi-squared statistics are also reported. There is no post estimation VIF for ordered probit models. All the standard errors have been checked and none are large enough to suggest that multicollinearity is an issue in the study.

1. The conference information booklet listed the names of all the fifty-seven SMPs in attendance. In order to avoid duplication, these practices were removed from the sampling frame before the sample for the postal survey was selected. [↑](#footnote-ref-1)
2. Standard Industrial Classification. [↑](#footnote-ref-2)
3. We adopted European Commission (European Commission, 2003) definition of SMEs as follows: micro firms (1-9 employees), small firms (10-49 employees) and medium-sized firms (50-249 employees). [↑](#footnote-ref-3)