

# **Proactive Entrepreneurial Behaviour, Market Orientation, and Innovation Outcomes:**

## **A Study of Small- and Medium-sized Manufacturing Firms in the UK**

### **ABSTRACT**

#### **Purpose:**

Drawing from resource-based theory, we study how and under what conditions small- and medium-sized firms (SMEs) capitalise on their proactive entrepreneurial behaviour (PEB) to achieve new product development (NPD) performance.

#### **Methodology:**

Our data were drawn from a cross-sectional questionnaire survey of 401 UK-based SMEs in the manufacturing sector.

#### **Findings:**

We identify an upward curvilinear relationship between PEB and NPD performance. Taking a step further, we propose and confirm that this curvilinear association arises from, in part, SMEs' innovation capability, which in turn translates into NPD performance. We also find that this upward curvilinear relationship between PEB and innovation capability flips to a downward curvilinear relationship when firms pursue a customer and competitor orientation.

#### **Originality:**

This paper looks beyond the linear relationship that exists among entrepreneurial behaviour, market orientation and innovation outcomes.

**Keywords:** Proactive entrepreneurial behaviour; Innovation capability; New product development; Customer orientation; Competitor orientation

## Introduction

The pursuit of innovation is an important tactic that firms employ to compete in an increasingly dynamic and complex global marketplace (Baker and Sinkula, 2009; Hong et al., 2013; Zhou et al., 2005). This is particularly true for small- and medium-sized firms (SMEs) that lack of resource abundance to compete in mature product markets (Li and Atuahene-Gima, 2001). Thus, researchers have devoted significant attention to identifying the drivers of innovation outcomes (e.g. Laforet, 2009; O'Cass and Weerawardena, 2009). A stream of literature focusses specifically on understanding the role of the entrepreneurial behaviour-market orientation interface (E-MO interface) in facilitating innovation outcomes. At the firm level, both entrepreneurial behaviour and market orientation reflect an organisation's deeply-rooted beliefs and values in relation to resource allocation to achieve strategic objectives. Entrepreneurial behavior<sup>1</sup> is manifested through an organisation's strategic posture to pursue business opportunities, while market orientation is demonstrated by an organisation's strategic behaviour of identifying and responding to market demands (Atuahene-Gima and Ko, 2001; Rhee et al., 2010; Schindehutte et al., 2008). This research aims to extend this literature stream by addressing three important gaps.

First, the extant literature highlights the positive relationship between entrepreneurial behaviour and innovation outcomes (see Table 1). Despite recognising that different types of entrepreneurial behaviour place emphasis on different strategic actions (Covin and Slevin, 1989; Lumpkin and Dess, 1996), most studies still focus on examining the impact of a collection of entrepreneurial behaviours, (which together form a unidimensional entrepreneurial strategic posture) on innovation outcomes. Few studies have taken a step

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<sup>1</sup> It should be noted that a relationship exists between entrepreneurial orientation and entrepreneurial behaviour. Entrepreneurial behaviour reflects different individual salient characteristics that are entrepreneurial in nature (autonomy, risk-taking, etc.). An entrepreneurial orientation comprises various types of independent entrepreneurial behaviour (Atuahene-Gima and Ko, 2001; Covin and Slevin, 1989; Mueller et al., 2012). The most popular form of entrepreneurial orientation embraces three types of entrepreneurial behaviour – proactiveness, innovativeness and risk-taking (Li et al., 2006; Renko et al., 2009).

further to explore how a specific type of entrepreneurial behavior actually affects innovation outcomes (See Table 1). Furthermore, recent work shows that the impact of entrepreneurial behaviour on firms' business performance may not be linear in nature (Kreiser et al., 2013). Thus, the issue of whether entrepreneurial behaviour displays a nonlinear relationship with innovation outcomes requires examination. Our study fills this important gap by investigating the relationship between proactive entrepreneurial behaviour (PEB) – a specific type of entrepreneurial behaviour – and new product development (NPD) performance – an ultimate innovation outcome.

“Insert Table 1 about Here”

Second, prior studies suggest that firms' entrepreneurial behaviour may not automatically lead to innovation outcomes (e.g. Baker and Sinkula, 2009; Hong et al., 2013). This raises the necessity of identifying and examining potential mediators that can direct the curvilinear impact of entrepreneurial behaviour towards innovation outcomes. In this research, we propose that innovation capability acts as a mediator in the PEB-NPD performance relationship. We argue that the curvilinear impact of PEB is due to innovation capability, which in turn contributes to NPD performance. This is the first study to offer and test the indirect curvilinear relationship among PEB, innovation capability, and NPD performance. Finally, previous studies suggest that market orientation plays a complementary role in strengthening the impact of entrepreneurial behaviour on innovation outcomes (e.g. Atuahene-Gima and Ko, 2001; Boso et al., 2012; Schindehutte et al., 2008). However, the question of whether this positive moderation effect also occurs if the impact of entrepreneurial behaviour is nonlinear in nature remains unexplored. To fill this gap, we differentiate between customer orientation and competitor orientation that reflects firms' market orientation, and examine their moderating influence on the relationship between PEB and innovation capability.

## **Theoretical Background and Hypotheses**

### **Literature Review**

Many studies have specifically examined the impacts of the E-MO interface on innovation outcomes. We categorise their research foci into three general themes. The first theme focuses on understanding the direct impacts of both entrepreneurial behaviour and market orientation on innovation outcomes (e.g. Frishammar and Åke Hörte, 2007; González-Benito et al., 2015; Tajeddini, 2010). The second research theme explores the intermediate mechanisms whereby the E-MO interface affects innovation (e.g. Baker and Sinkula, 2009; Li et al., 2006; Yu et al., 2016). For example, Hong et al. (2013) show that market orientation affects NPD performance via new product development proficiency and product meaningfulness, while entrepreneurial behaviour orientation affects NPD performance via proficient intellectual property management and product novelty.

The third research theme shifts the focus to the interaction effects of entrepreneurial behaviour and market orientation on innovation outcomes (e.g. Nasution et al., 2011; Thourunrojje and Racela, 2013; Verhees and Meulenbergh, 2004). The findings regarding whether or not the interaction between entrepreneurial behaviour and market orientation have a desirable, positive effect on innovation outcomes are subject to controversy. For example, Boso et al. (2012) suggest that entrepreneurial behaviour is more likely to be a driver of innovation success when the market-oriented behaviour is strong. In contrast, Morgan et al. (2015) find that entrepreneurial orientation has a positive impact on NPD performance, but that occurs to a lesser degree when firms simultaneously implement market orientation. To extend these three themes, we look beyond the linear relationship between E-MO interface and innovation outcomes. Building on the resource-based theory, we develop a framework (see Figure 1). We elaborate our discussions below.

“Insert Figure 1 about here”

### **Direct Effect of PEB on New Product Development Performance**

Resource-based theory posits that firms’ unique resources are the key drivers of superior performance (Barney et al., 2011). We conceptualise NPD performance as the dependent variable in our framework. This conceptualisation builds on resource-based theory because, according to this theory, performance variables represent the most common ultimate consequences (Amit and Schoemaker, 1993; Murray et al., 2011). In this research, we examine performance related to the introduction of new products. Specifically, we define NPD performance as the degree of success of the new product introduction regarding financial and market performance, which represents one of the ultimate innovation outcomes (Atuahene-Gima and Ko, 2001; Morgan et al., 2015; Schultz et al., 2013).

The independent variable in our framework is PEB. We define PEB as firms’ strategic decision to take the initiative in anticipating and pursuing new opportunities, which represents an important salient characteristic of entrepreneurial behaviour<sup>2</sup> (Covin and Slevin, 1989; Lumpkin and Dess, 1996). According to resource-based theory, PEB reflects a firm’s deeply-rooted beliefs and values that direct its focus towards creating a first-mover advantage to achieve superior performance (Kreiser et al., 2013; Simon et al., 2002; Song et al., 2000), that considers as an important resource of the firm (Lumpkin and Dess, 1996; Zhou et al., 2005). Scholars have applied this concept to describe an SME’s PEB as its propensity to take

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<sup>2</sup> We distinguish between two similar concepts: PEB and pioneering behaviors. PEB refers to an array of strategic actions includes initiation of competitive actions, introduction of new products, and proactive operating techniques (Covin and Slevin, 1989; Nasution et al., 2011). Pioneering behaviors place more emphasis on a firm’s strategy to become the first one to offer a distinctively new product to the market (Covin et al., 2000; Mueller et al., 2012). Thus, the concept of PEB contains the ideas of pioneering behaviors (Lumpkin and Dess, 1996; Mueller et al., 2012). Focusing on PEB allow us to capture a broader scope of a firm’s strategic posture of positioning itself in anticipation of changes in the market by taking an active role to sharp the future state of its external environment (Kreiser et al., 2013; Lumpkin and Dess, 1996)

the forward-looking stance to shape the business environment (Nasution et al., 2011; Rhee et al., 2010; Simon et al., 2002).

Drawing on resource-based theory, that highlights the resources-performance linkage (Barney et al., 2011), we anticipate a positive relationship between PEB and NPD performance. First, firms that place a strong emphasis on acting ahead of the competition in anticipation of future market demand are more likely to direct their resources to support the introduction of new products (Covin et al., 2000; Mueller et al., 2012). Second, proactive firms reflect a spirit of being highly opportunity seeking (Lumpkin and Dess, 1996). Such firms are more likely to direct their resources to support the development of highly innovative product features (Simon et al., 2002; Song et al., 2000). Both of these factors suggest that firms that demonstrate strong PEB often face little competition in the marketplace, because no other companies have similar products (Lieberman and Montgomery, 1988; Song et al., 2000). Accordingly, their new products are more likely to meet firms' sales, market share and profit objectives.

The positive relationship between PEB and NPD performance may not be linear. In particular, the positive effect of PEB on NPD performance may be weaker if PEB is low, while this positive effect may become stronger if PEB is high. Unlike large companies that can use slack resources to support certain non-current strategy-related actions, SMEs with limited resources are unlikely to support actions unrelated to their strategies (Mazzarol et al., 2009; McKelvie and Davidsson, 2009). This means that less proactive SMEs are less likely to allocate resources to support NPD initiatives because their strategic intentions are not focusing on introducing new products to seize future opportunities. Therefore, they are less likely to introduce new products with highly innovative features, and so less likely to achieve strong NPD performance. Thus, the positive effect of PEB on NPD performance is weaker when PEB is low. In contrast, highly proactive SMEs are more likely to invest substantial

resources in supporting NPD initiatives. They are more likely to introduce new products with highly innovative features, which in turn increase the likelihood of achieving strong NPD performance. Furthermore, when highly proactive SMEs constantly engage in NPD-related activities, their ability to evaluate and use new technologies in NPD will improve (Lieberman and Montgomery, 1988; Zhou and Wu, 2010). As a result, they are more able to develop better products with more innovative features, which in turn foster NPD performance. Therefore, PEB may facilitate positive NPD performance at an accelerating rate, when SMEs have strong proactiveness. Collectively, we predict,

Hypothesis 1: PEB has an upward curvilinear relationship with NPD performance in the SME context.

### **Mediating Role of Innovation Capability**

In this study, we propose that innovation capability serves as a mediator between PEB and NPD performance. Innovation capability<sup>3</sup> reflects firms' capacity to develop new solutions and perform innovation activities (Calantone et al., 2002; Ngo and O'Cass, 2012). This consideration is based on the recent extension of resource-based theory, that posits that firms' unique and valuable resources do not automatically lead to superior performance (Murray et al., 2011; Zhou et al., 2008). Instead, firms can use their resources to create certain organizational capabilities, which enable them to perform value-creating tasks effectively and achieve superior performance (Amit and Schoemaker, 1993; Teece et al., 1997). Applying this resource-capability-performance framework, this study proposes

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<sup>3</sup> We distinguish between innovative behaviour (innovativeness) and innovation capability. Innovative behaviour describes firms' deeply-rooted belief and values that direct their focus towards engaging in and supporting innovative activities such as experimentation and NPD (De Clercq et al., 2016; Lumpkin and Dess, 1996). Innovation capability describes firms' capacity to perform innovative activities (Calantone et al., 2002; Ngo and O'Cass, 2012). Thus, innovative behaviour reflects firms' strategic posture, that involves a propensity to be innovative, and so form a type of entrepreneurial behaviour. Innovation capability, on the other hand, represents a type of organisational capability that enables firms to perform value-creative tasks (i.e. innovation activities) effectively. Therefore, we do not consider innovation capability to be a type of entrepreneurial behaviour in this study.

innovation capability to be the type of organizational capability that mediates between PEB (resources) and NPD performance (performance). This perspective builds on prior research that emphasized the important contribution of innovation capability to an NPD program's success (e.g. Ngo and O'Cass, 2012; Verhees and Meulenbergh, 2004), and that PEB drives the engagement of innovation activities (e.g. Covin et al., 2000; Kreiser et al., 2013).

We expect a positive relationship between PEB and innovation capability. This consideration reflects the resource-capability link (Amit and Schoemaker, 1993; Murray et al., 2011). As firms accumulated rich experience in a particular field, they develop deeper knowledge and complex routines that enable them to perform field-specific activities and solve field-specific problems, upon which the (field-specific) capability is based (Levinthal and March, 1993; Zollo and Winter, 2002). Applying this to our study context, the development of innovation capability requires firms to accumulate experience through repeatedly performing innovation-related activities (such as NPD) and develop a deeper understanding of how they can perform such activities effectively and efficiently (Ngo and O'Cass, 2012; Teece et al., 1997). PEB constitutes an organizational resource (Lumpkin and Dess, 1996; Zhou et al., 2005) that direct firms' focus towards initiating NPD programmes in order to anticipate and pursue new opportunities (Lumpkin and Dess, 1996; Mueller et al., 2012), and innovation-related activities lie at the heart of such processes (Li and Atuahene-Gima, 2001; Ngo and O'Cass, 2012). As a result, proactive firms are more likely to acquire significant experience related to innovation-related activities and develop a strong innovation capability.

This positive relationship between PEB and innovation capability may not be linear in the SME context. Due to resource constraints, SMEs are less likely to invest substantial resources in supporting organisation-wide activities, if these are inconsistent with their strategic focus (Mazzarol et al., 2009; McKelvie and Davidsson, 2009). Applying this logic,



we argue that it is unlikely for less proactive SMEs to allocate many resources to supporting innovation-related activities because being proactive by introducing new products to seize new opportunities is not their strategic focus. As a result, they are less likely to accumulate rich innovation-related experience or develop a strong innovation capability. Thus, the positive effect of PEB on innovation capability is weaker when PEB is low. In contrast, highly proactive SMEs are more likely to invest substantial resources in supporting innovation-related activities to enable them to introduce new products to the marketplace frequently and so are more likely to accumulate significant innovation-related experience. Furthermore, as SMEs build up their experience related to innovation activities, they become more competent regarding organizing innovation-related experience due to the positive link between experience and learning (Levinthal and March, 1993; Zhou and Wu, 2010). This self-reinforcing nature makes SMEs more efficient at integrating new innovation-related experience into their existing knowledge base. Thus, we argue that PEB facilitates innovation capability at an accelerating rate, when SMEs are proactive.

We also expect that firms' innovation capability positively affect their NPD performance. Organisational capabilities enable firms to perform value-creating tasks more effectively than their competitors (Amit and Schoemaker, 1993; Barney et al., 2011). SMEs that possess an innovation capability perform innovation activities more efficiently than their competitors (Calantone et al., 2002; Ngo and O'Cass, 2012). As a result, they are more likely to develop new products with more innovation features to meet their customers' needs (Simon et al., 2002; Song et al., 2000). Combining the above arguments, the relationship among PEB, innovation capability, and performance reflects the resource-capability-performance link. According to resource-based theory scholars, firms' resources can be used to support the development of their capacity to perform value-creating tasks (capability) to improve performance (Amit and Schoemaker, 1993; Murray et al., 2011). Drawing on this

logic, we suggest that innovation capability should function as a critical intermediate mechanism that connects PEB with NPD performance. This upward curvilinear association is due to the influence of PEB on innovation capability, which in turn translates into SMEs' NPD performance.

Hypothesis 2: Innovation capability mediates the relationship between PEB and NPD performance, whereas PEB has an upward curvilinear effect on innovation capability, and innovation capability has a positive linear effect on NPD performance within the SME context.

### **Contingent Role of Market Orientation**

Prior work on the resource-capability-performance framework also shows that a range of contingency factors may influence the relationship between resources and capability (Murray et al., 2011; Zhou et al., 2008). Drawing on this aspect of resource-based theory, we further conceptualise two dimensions of market orientation – *customer orientation* and *competitor orientation* – as the moderating variables. Customer orientation emphasises the role of sufficiently understanding the target customers, while competitor orientation focusses on understanding and responding to the competitors' strategies (Gatignon and Xuereb, 1997; Zhou et al., 2007). Although both dimensions describe an aspect of corporate culture that prioritises the use of market intelligence to create and deliver superior value, they represent different norms and beliefs that guide firms' actions (Gatignon and Xuereb, 1997). Zhou et al. (2007) suggest that customer-oriented firms focus on analysing their customers' needs and wants, while competitor-oriented firms focus on matching the marketing initiatives of their competitors. In relation to our study, the prior work suggest that firms' innovation strategies may vary in shape depending on whether firms choose to focus on their customers or their competitors (Gatignon and Xuereb, 1997; Spanjol et al., 2012; Zhou et al., 2005).

We predict that customer orientation moderates the upward curvilinear relationship between PEB and innovation capability within the SME context. In particular, we posit that

customer orientation may intensify the positive effect of PEB on innovation capability when SMEs have relatively weak PEB. This is because pursuing customer orientation helps less proactive SMEs to gain more customer insights (Gonzalez-Benito et al., 2009; Schindehutte et al., 2008), which in turn reveals the importance of addressing customers' needs through innovation (Song et al., 2000; Zhou et al., 2005). Therefore, they will start to allocate resources towards engaging innovation-related activities, which subsequently allows them to accumulate innovation-related experience. The accumulation of innovation-related experience allows firms to gain insights into refining and improving the innovation processes that serve to improve firms' innovation capability. As a result, the relationship between PEB and innovation capability intensifies when SMEs' PEB is relatively weak.

Customer orientation coupled with strong PEB may also improve SMEs' innovation capability. The pursuit of customer orientation enhances proactive SMEs' efforts in collecting and analysing customer information (Raju et al., 2011), and thus they become better able to anticipate their customers' needs. This will inspire proactive SMEs to engage more strongly in innovation activities related to developing and introducing new products because they find taking active role in shaping the future state of their external environment attractive (Lieberman and Montgomery, 1988; Lumpkin and Dess, 1996). Such movements will enable proactive SMEs to accumulate significant experience about innovation, which in turn fosters the enhancement of innovation capability. In general, we argue that proactive SMEs are more likely to develop a strong innovation capability when customer orientation is strong. Combining the above arguments, we predict:

Hypothesis 3: The upward curvilinear effect of PEB on innovation capability is stronger (steeper) when customer orientation is high within the SME context.

On the other hand, we predict that competitor orientation weakens the upward curvilinear relationship between PEB and innovation capability within the SME context. In

particular, we argue that competitor orientation weakens the effect of PEB on innovation capability when SMEs' PEB is relatively weak. Less proactive SMEs already engage in fewer innovation-related activities, because they do not consider actively seeking to redefine their market a high strategic priority (Lumpkin and Dess, 1996; Mueller et al., 2012). When pursuing competitor orientation, monitoring and responding to competitors' actions become high priority activities for SMEs (Gatignon and Xuereb, 1997; Zhou et al., 2007). When SMEs face resources constraint, less proactive SMEs will tend to shift resources from backing low strategic priority activities towards supporting activities with a high strategic priority. This means that less proactive SMEs will further reduce their engagement in innovation-related activities, which in turn reduces their innovation capability. Thus, the effects of PEB on innovation capability are likely to be lower for SMEs that are less proactive.

Competitor orientation also weakens the relationship between PEB and innovation capability when SMEs' PEB is relatively strong. When proactive SMEs pursue competition orientation, their focus is on responding to their existing competitors' movements (Gatignon and Xuereb, 1997; Spanjol et al., 2012). As a result, they only develop products that can compete with those of their competitors. Even though SMEs still proactively introduce new products, the range of products becomes narrower. This means that proactive SMEs are less likely to accumulate very much new innovation-related experience. This subsequently reduces SMEs' chances of combining new innovation-related experiences with their existing knowledge base about innovation to improve their innovation capability. In general, PEB will have less effect on innovation capability when SMEs have strong PEB. Combining the above arguments, we predict:

Hypothesis 4: The upward curvilinear effect of PEB on innovation capability is weaker (flatter) when competitor orientation is high within the SME context.

## **Research Method**

## Measurement and Data Collection

Our data were drawn from a cross-sectional questionnaire survey of UK-based SMEs in the manufacturing sector. We adopted a survey data collection design because 1) no secondary data are available for the key constructs relevant to our test model (see Figure 1) and 2) it allows us to develop a generalizable conclusion about a specific pattern of behaviour by assessing a large number of respondents across different categories (i.e. manufacturing business areas) (Hair et al., 2010). SME manufacturing firms were chosen for this study for two reasons. First, it is very difficult for SME manufacturing firms to compete with large manufacturing firms in the mature marketplace due to their limited resources, so pursuing an innovation strategy is one way to overcome this challenge (Li and Atuahene-Gima, 2001; O'Cass and Weerawardena, 2009). The typical types of innovation that manufacturing firms pursue includes product innovation, process innovation and managerial (or administrative) innovation (Kim et al., 2012). Second, developing and introducing new products quicker and earlier than competitors is a key source of competitive advantage for manufacturing firms (Lieberman and Montgomery, 1988; Song et al., 2000).

We measured all of the variables using multi-item, Likert-type scales adopted from existing studies (see Appendix 1). For *PEB*, we adopted and modified measurement items from prior studies to assess the extent of anticipated changes in the market and firms' active role in shaping the future state of their environment (e.g. Covin and Slevin, 1989; Frishammar and Åke Hörte, 2007; Nasution et al., 2011). We adopted and modified *customer orientation* (the behaviour and beliefs that place a priority on identifying, monitoring and responding to customers' needs) and *competitor orientation* (the behaviour and beliefs that place a priority on identifying, monitoring and responding to competitors' actions) measurements from Spanjol et al. (2012), Narver and Slater (1990) and Gatignon and Xuereb (1997). For *innovation capability*, we used and modified the scale proposed by Ngo and

O'Cass (2012) to assess firms' ability to perform innovation activities (related to product/services, production processes and management) in comparison to their competitors. For *NPD performance*, we adopted and modified the scale proposed by Schultz et al. (2013) to capture the effect of NPD efforts on profitability, revenue generation and market share. We use a subjective measure of relative performance because 1) studies show the convergent validity of subjective and objective performance, 2) objective financial measurement may be biased according to their purpose, 3) it is difficult to acquire objective measurements in the SME setting, and 4) managers' subjective perceptions primarily drive managerial decisions (Gatignon and Xuereb, 1997; Narver and Slater, 1990).

Finally, based on the prior literature (Gatignon and Xuereb, 1997; Schultz et al., 2013; Spanjol et al., 2012), six control variables are included in the model: firm size (based on revenue), age, employee number, product type (within the manufacturing sector), competitive intensity, market turbulence, and technology turbulence in the model. We applied log transformation for firm size, age, and employee number. The product types are dummies that use "others" as the benchmark group. We adopted and modified two items to assess competitive intensity from Zhou et al. (2005). A sample item is "the competition in our industry is cutthroat". Finally, we used three items to assess market turbulence and two items to assess technological turbulence from Schultz et al. (2013). A sample item for market turbulence is "customer preferences change rapidly", while a sample item for technological turbulence is "the technology in our industry is changing rapidly". Furthermore, we also employed innovation orientation as a control variable in this study in order to identify the unique contribution of a firms' innovation orientation to firm NPD performance (Gatignon and Xuereb, 1997; Zhou et al., 2005), as well as the development of innovation capability (Siguaw et al., 2006). We used and modified three items proposed by Stock and Zacharias

(2011) to assess firms' innovation orientation. A sample item is "The aim of our company is to generate innovative products".

To ensure the content and face validity of the measurement, we conducted a pre-test by obtaining comments from five representatives from different SMEs. We asked them to verify the relevance and completeness of our measurement by answering all of the survey items and provided feedbacks. On the basis of their responses, we then refined the questions, instructions and terminology in light of their suggestions and finalized the survey. We contacted a marketing company and searched for contact information for UK-based SMEs in the manufacturing sector. We then sent a cover letter to the firm's general manager (or CEO) to ask him/her to complete the questionnaire on behalf of that firm. We obtained 401 usable questionnaires (out of 3286) from SMEs. To ensure that non-response bias is not an issue, we compared the answers between the early and late respondents and found no significant differences between them (Armstrong and Overton, 1977). Table 2 summarizes the characteristics of the respondents.

"Insert Table 2 about Here"

### **Validity and Reliability**

Because we measured all of the constructs based on self-reports, we follow the suggestion to use multiple statistical remedies to rule out potential common method bias (Podsakoff et al., 2003; Podsakoff et al., 2012). First, we performed Harman's single-factor test (Hair et al., 2010). Second, we applied CFA marker variable techniques (Williams et al., 2010) using motivation-enhancing human resource management practices (four items) adopted from Prieto and Santana (2012). A sample item is 'the employees in this organisation receive monetary rewards based on their performance'. Both results suggested that common method variance is not a concern for this study. We also followed Podsakoff et al. (2003) in

using procedural remedies to minimize common method bias such as ensuring the anonymity and confidentiality of the responses, and emphasized that there were no right or wrong answers. Lastly, multi-items scales and complex data relationships (i.e. moderating and nonlinear effects) help to alleviate possible concerns regarding common method bias, because the respondents cannot guess the research hypotheses or respond in a socially desirable manner, that would lead to spurious findings (Podsakoff et al., 2012).

“Insert Table 3 about here”

We assessed the construct validity using confirmatory factor analysis. According to suggestions by Hair et al. (2010) regarding the comparative fit index (CFI), normed fit index (NFI), goodness of fit index (GFI), and root mean square error of approximation (RMSEA), the overall model fits the data satisfactorily ( $X^2 = 250.743$ ;  $df = 80$ ;  $X^2/df = 3.134$ ;  $p = .000$ ;  $NFI = .907$ ;  $CFI = .934$ ;  $GFI = .921$ ;  $RMSEA = .073$ ). We also calculated the value of the composite reliability (CR) for each construct, and all exceed the .70 benchmark. The average variance extracted (AVE) for all of the constructs exceeded the .50 benchmark. These results demonstrate that our measurements possess sufficient convergent validity and reliability. Furthermore, we calculated the square root value of the AVE for each construct and found that the resulting value for each construct was greater than all of its correlations with other constructs, providing support for discriminant validity (Fornell and Larcker, 1981). We present the above findings in Table 3. Finally, we calculated the variance inflation factors (VIFs) to assess the possibility of multicollinearity. The results suggested that all of the VIFs were below 10, which indicates that multicollinearity is not a serious problem in this analysis (Hair et al., 2010). Based on all of the above points, we argue that our research possesses both reliability and validity.

## **Analysis and Results**



To assess our hypotheses, we performed multiple regression analysis using SPSS. Table 4 presents the results of our analysis.

“Insert Table 4 about here”

Recall that hypothesis 1 proposes an upward curvilinear relationship between PEB and NPD performance. To test this hypothesis, we employed the approach suggested by Aiken and West (1991). In Model 1, we included only the control variable. In Model 2, we added the independent variable-PEB ( $\beta = .329, p < .000$ ) and the quadratic term of PEB ( $\beta = .109, p < .010$ ) since both entries exhibited a positive and significant relationship with NPD performance. Our findings confirm hypothesis 1. To depict this curvilinear relationship, we plot the relationship in Figure 2.

“Insert Figure 2 about here”

Hypothesis 2 predicts that the upward curvilinear effect of PEB on NPD performance is mediated by innovation capability. In particular, there is an upward curvilinear relationship between PEB and innovation capability, and a linear positive relationship between innovation capability and NPD performance. To examine this hypothesis, we followed Hayes and Preacher (2010). First, in Model 4, we estimated the effects of PEB ( $\beta = -.290, p > .100$ ) and the quadratic term of PEB ( $\beta = .088, p < .010$ ) on innovation capability. Given that the quadratic term of PEB is positive and significant, the PEB displayed an upward curvilinear relationship with innovation capability. Second, in Model 3, we found that the effects of innovation capability ( $\beta = .171, p > .010$ ) on NPD performance are positive and significant when accounting for the effect of PEB and the quadratic term of PEB. Third, we calculated the instantaneous indirect effect in relatively low (25<sup>th</sup> percentiles), relatively moderate (50<sup>th</sup> percentiles) and relatively high (75<sup>th</sup> percentiles) situations using a bootstrap analysis with 10,000 samples. Our results suggested that the instantaneous indirect effects in all three situations are positive and significant (relatively low:  $\beta = .029, p < .050$ ; relatively moderate:

$\beta = .052, p < .050$ ; relatively high:  $\beta = .074, p < .050$ ), with a 95% confidence interval which does not include zero. Furthermore, we plotted the upward curvilinear relationship between PEB and innovation capability (see Figure 2). Surprisingly, we found that, at relatively low levels of PEB, the curvilinear relationship is displayed as a U-style shaped curve. The implications of this finding will be discussed later.

To investigate the moderation effects in hypotheses 3 and 4, we followed the approach proposed by prior research (Aiken and West, 1991; Jaccard and Turrissi, 2003) to estimate three models (Models 5-7). In all three models, we included control variables, PEB, and the quadratic term of PEB, and also accounted for the effects of customer orientation and competitor orientation. Finally, we added different combinations of interaction terms in Models 3-5. Hypothesis 3 posits that the upward curvilinear effect of PEB on innovation capability is stronger (steeper) when customer orientation is high. In Model 5, we added two interaction terms: PEB x customer orientation ( $\beta = -.034, p > .100$ ), and the quadratic term of PEB x customer orientation ( $\beta = -.057, p < .100$ ). The significance of the latter interaction terms suggests that the upward curvilinear effect of PEB on innovation capability actually becomes weaker (instead of stronger) when customer orientation is high. Thus, we must reject hypothesis 3. In Model 6, we added two interaction terms: PEB x competitor orientation ( $\beta = -.077, p > .100$ ), and the quadratic term of PEB x competitor orientation ( $\beta = -.072, p < .050$ ). The significance of the latter interaction terms suggest that the upward curvilinear effect of PEB on innovation capability becomes weaker when competitor orientation is high. Thus, we may accept hypothesis 4.

We also included all of the interaction terms simultaneously in Model 7, but found that their effects became insignificant. Previous research indicates that the simultaneous inclusion of multiple interaction terms that share common variables may prevent the detection of moderating effects, due to the complex constellation of factors caused by such

simultaneity (De Clercq et al., 2016). Nevertheless, the consistency of the signs of the interaction terms in Models 5-7 provided some indication of robustness (Arnold, 1982; De Clercq et al., 2016). Finally, we plot the results from Models 5 and 6 in Figure 2. Surprisingly, we find a shape-flip phenomenon in our graphical representation (Haans et al., 2015). In particular, PEB displayed a downward curvilinear relationship with innovation capability, rather than an upward one, as in our earlier findings. We discuss the implications of these findings in detail below.

## **Discussion and Concluding Remarks**

### **Academic Contribution**

As a first contribution, we demonstrate an upward curvilinear relationship between PEB and NPD performance. These findings advance E-MO interface-innovation outcomes studies on two related fronts. First, most of these studies acknowledge that the pursuit of entrepreneurial behaviour can enhance NPD performance. However, these studies tend to conceptualise entrepreneurial behaviour as a unidimensional strategic posture that comprises multiple types of individual behaviour that are entrepreneurial in nature (see Table 1), when examining the linear relationship between collective entrepreneurial behaviour and innovation outcomes. Our study advances the extent literature by proposing and confirming empirically the nonlinear relationship between a specific type of entrepreneurial behaviour (i.e. PEB) and NPD performance. Second, the few studies that examine the impact of PEB (as an individual entrepreneurial behaviour) on NPD performance offer mixed findings. For example, Frishammar and Åke Hörte (2007) found that firms' proactivity towards introducing new products has a weak/nonsignificant impact on their NPD performance. In contrast, Schultz et al. (2013), in their secondary findings, found that proactiveness positively affects NPD performance. Our research offers a novel explanation for these mixed results by

suggesting that the relationship between PEB and NPD performance is of an upward curvilinear nature. More specifically, the positive effect of PEB on NPD performance is stronger when SMEs are more proactive and weaker when SMEs are less proactive. In general, our study provides a more nuanced understanding of the relationship between entrepreneurial behaviour and NPD performance.

A second contribution is that we clarify the process whereby PEB affects NPD performance. First, we confirm that the relationship between PEB and innovation capability is nonlinear upward shaped. After plotting this, we also find, surprisingly, that the relationship between PEB and innovation capability is negative when PEB is at a relatively low level. Together with the upward curvilinear effects at moderate and high levels, it forms a U-shaped relationship. To explain this finding, we suggest that the development of innovation capability may require firms to accumulate innovation-related experience by proactively introducing new products beyond a certain level, before which any additional experience acquired may interfere with their existing knowledge base for performing certain tasks such as innovation (Edmunds and Morris, 2000). As a result, PEB has a negative effect on innovation capability when SMEs are less proactive. Second, our findings suggest that the indirect effect of the intermediate mechanisms is significant. These results contribute to the E-MO interface-innovation outcomes literature not only by introducing innovation capability as a new mediator (Li et al., 2006; Rhee et al., 2010; Yu et al., 2016), but also by further explaining the formation processes of the upward curvilinear relationship between PEB and NPD performance, as we discussed earlier. Furthermore, these findings also suggest that the association among resources, capabilities, and performance may not always be linear in nature. In doing so, we offer a fresh theoretical angle regarding the application of the resource-capability-performance framework and resource-based theory in general (Murray et al., 2011; Zhou et al., 2005).

Our third contribution concerns the role of market orientation in the entrepreneurial behaviour-innovation outcomes relationship. We differentiate between two types of market orientation – customer orientation and competitor orientation (Gatignon and Xuereb, 1997; Zhou et al., 2007) – and examine their impact on the nonlinear relationship between PEB and innovation capability. We find that competitor orientation negatively moderates this upward curvilinear relationship, as predicted. Contrary to our prediction, however, we also find that customer orientation negatively affects the upward curvilinear relationship between PEB and innovation capability. Furthermore, by plotting these negative moderating effects, we find that the curvilinear relationship between PEB and innovation capability flips from upward to downward (see Figure 2). According to Haans et al. (2015), this form of shape-flipping curve occurs when a very strong moderation effect occurs and causes the curve to flatten out or steepen significantly, and then change shape. This suggests that both customer orientation and competitor orientation have a very strong negative moderation effect in causing the U-shaped relationship between PEB and innovation capability to change shape.

One possible explanation is that, when pursuing customer orientation, SMEs will shift their strategic focus from exploring new business opportunities to exploiting their existing ones. Given SMEs' resource constraints, they may use their resources to support a few activities that closely conform to their strategic focus (Mazzarol et al., 2009; McKelvie and Davidsson, 2009). As a result, the pursuit of customer orientation may alter SMEs' resource allocation decisions to support their objective of delivering better value to their existing customers (i.e. providing better services), instead of supporting innovation-related activities. SMEs' decreasing propensity to develop and introduce new products proactively as they become more customer-oriented will subsequently reduce their ability to accumulate rich innovation-related experience, which in turn diminishes their innovation capability at an

accelerating rate. Thus, the upward curvilinear relationship between PEB and innovation capability will flip to a downward curvilinear relationship.

In terms of competitor orientation, its negative influence on PEB and innovation capability is stronger than we predicted. SMEs may not only suffer as a result of accumulating less new experience about innovation (due to their narrower product range), but also need to invest more resources in analysing and monitoring their competitors' movements when pursuing high levels of competitor orientation. When SMEs with limited resources choose to invest more in analysing and monitoring their competitors' movements, they often need to withdraw resources from other activities (Mazzarol et al., 2009; McKelvie and Davidsson, 2009). In this situation, SMEs are more likely to decide to withdraw resources from innovation-related activities, if they focus on developing a narrow range of products only. As SMEs become more competitor-oriented, they will accumulate increasingly less innovation-related experience. Consequently, PEB displays a downward curvilinear relationship with innovation capability when competitor orientation is strong.

In general, these findings offer new insights regarding the role of market orientation in facilitating entrepreneurial behaviour and innovation outcomes. The results of our research challenge the existing studies that advocate the complementary effects of market orientation and entrepreneurial behaviour on innovation (e.g. Atuahene-Gima and Ko, 2001; Schindehutte et al., 2008; Tajeddini, 2010). PEB reflects SMEs' incentive to capture the first-mover advantage (Covin et al., 2000; Lumpkin and Dess, 1996). We suggest that, when SMEs pursue PEB, the pursuit of market orientation will impede the effects of PEB on innovation outcomes. In this way, we link the studies of the E-MO interface with the first-mover advantage literature (e.g. Robinson and Chiang, 2002; Song et al., 2008) in the SME context.

## **Managerial Implications**

Our study has several implications for SME owner-managers. First, SME owner-managers should consider carefully the efforts and rewards when adopting PEB. More specifically, SMEs will achieve a disproportionately high level of profitability, revenue generation and market share, when SME owner-managers are highly proactive in exploring new opportunities. Conversely, SMEs can only achieve very weak NPD performance (rewards) when they display a relatively lower degree of proactivity. SMEs with limited resources may be reluctant to invest substantially to support the development of PEB (Covin et al., 2000; Simon et al., 2002). For that reason, we recommend that, if SMEs' owner-managers decide to pursue PEB, they should devote every effort (resources) to ensuring that the firm develops a very high level of proactivity, in order to capitalise on the benefits.

Second, SME owner-managers must be aware that PEB does not automatically lead to superior NPD performance. Without the competence to engage in innovation activities (i.e. product/service and process innovation), a firm cannot realize the value of PEB. Therefore, managers should focus their efforts not only on developing PEB but also on building SMEs' innovation capability. Furthermore, having a high level of PEB can help to facilitate the development of innovation capability, although SME owner-managers also need to realize that PEB can only contribute to the development innovation capability beyond a certain level. Since SMEs usually face resource constraints (Mazzarol et al., 2009; McKelvie and Davidsson, 2009), SME owner-managers should choose to devote resources towards nurturing PEB only if they are committed to building a high degree of propensity to be proactive.

Third, SMEs' owner-managers should recognise the dark side of market orientation. Scholars generally agree that pursuing a market orientation enables firms to acquire information about their customers' needs and monitor their competitors' actions, which can

further the firms' innovation efforts (e.g. Boso et al., 2012; Frishammar and Åke Hörte, 2007). However, the findings of our research support Morgan et al. (2015)'s suggestions that market orientation can sometime reduce the positive effects of entrepreneurial behaviour on innovation outcomes. More specifically, we find that, when SMEs pursue PEB and customer (or competitor) orientation simultaneously, the upward curvilinear effect of PEB on innovation capability will flip to a downward effect. As a result, while each strategic posture may make its own unique contribution towards the development of innovation capability, SME owner-managers need to be concerned with the impact of implementing PEB and (either customer or competitor orientation) simultaneously.

### **Limitations and Future Research Opportunities**

First, our research design may restrict us from drawing any definite conclusions about the causation effect among the variables over time. Furthermore, this research design may also raise concerns about common method variance. Researchers in the future might employ a longitudinal research design in order to confirm this causality empirically or use data collected from multiple respondents in each firm to combat this limitation. Second, we limit our investigation to UK-based SMEs in the manufacturing industry. Therefore, the generalisability of our findings remains limited to firms within a specific industry, company size, and country context. Future studies on different industries, company sizes, or countries would help to generalize our findings and expand the boundary conditions. Third, the independent variable chosen for this study – PEB – we adopted and modified the scales from existing studies. While we have gone through the necessary procedures to ensure the face validity, and statistical validity and reliability of our scales, however they may still not capture PEB sufficiently as the nature of (all types of) entrepreneurial behaviors is complex (Boso et al., 2012; Kreiser et al., 2013; Lumpkin and Dess, 1996). Future research should



attempt to capture the domain of PEB construct with much richer and more detailed scales. Fourth, although we requested in our cover letter that the general manager (or CEO) of the firm should complete the questionnaire on behalf of his/her organisation, due to the anonymity and confidentiality of the responses, we cannot eliminate the possibility that the respondent is not the general manager (or CEO) of the firm. Future researchers should consider using telephone or in-person surveys to address this research limitation.

Our findings also uncover other future research opportunities. To begin with, the curvilinear relationship (PEB  $\rightarrow$  NPD performance and PEB  $\rightarrow$  innovation capability) suggests some research opportunities. Are there any moderators related to market-oriented behaviour (such as customer market intelligence) that can steepen, flatten or flip-shape these curvilinear relationships between PEB and innovation capability? Are there any other mediators that can carry the curvilinear effects from PEB to NPD performance? Furthermore, the relationship between PEB, innovation capability and NPD performance may be more complex than we proposed in this study. Future researchers may wish to explore other potential models for explaining the relationship among these three variables. For example, feedback loops may exist due to the fact that a strong innovation capability or NPD performance may provide incentives for firms to pursue PEB. Lastly, future researchers might investigate other combinations of entrepreneurial behaviour and market orientation. In general, we hope that further research will continue to explore and document how the E-MO interface affects innovation.

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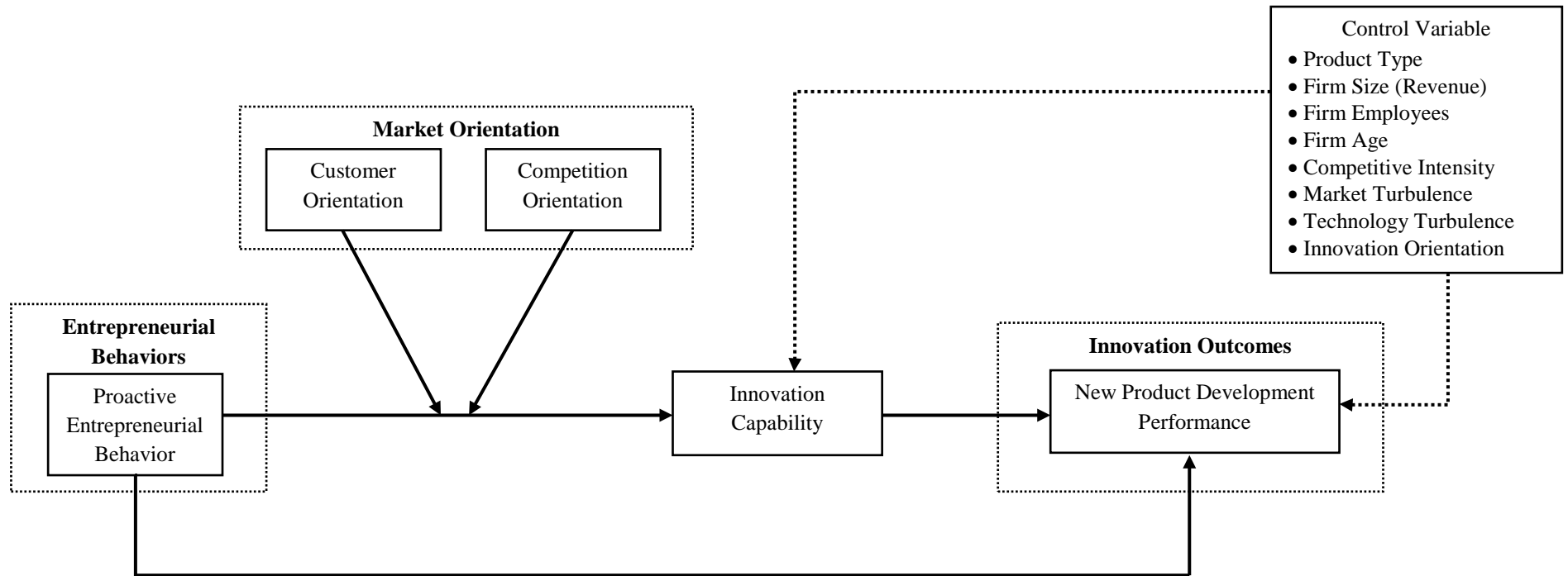
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**Figure 1: Conceptual Framework**



Note:  
Dashed arrows represent control variable path

**Table 1: Entrepreneurial Behaviors and Innovation Outcomes in E-MO interface Literature**

<b>Entrepreneurial Behavior</b>	<b>Key Studies</b>
<i>A group of independent entrepreneurial behaviors – an unidimensional strategic posture of a firm</i>	
Proactiveness; Innovativeness; Risk taking	Li et al. (2006); Thoumrungroje and Racela (2013); Schindehutte et al. (2008); Renko et al. (2009); Baker and Sinkula (2009); Hong et al. (2013); Morgan et al. (2015); Yu et al. (2016); González-Benito et al. (2015)
Proactiveness; Risk taking	Avlonitis and Salavou (2007); Rhee et al. (2010)
Proactiveness; Risk taking; Aggressiveness	Atuahene-Gima and Ko (2001)
Proactiveness; Innovativeness; Strategic planning	Tajeddini (2010)
Proactiveness; Innovativeness; Risk taking; Autonomy; Aggressiveness	Boso et al. (2012)
Autonomy; Risk taking; Proactiveness	Nasution <i>et al.</i> (2011)
<i>Individual entrepreneurial behavior</i>	
Proactiveness	Frishammar and Åke Hörte (2007)
Innovativeness	Frishammar and Åke Hörte (2007)
Risk taking	Frishammar and Åke Hörte (2007)
Proactivity in preparing for change	Zhou et al. (2005)
Domain specific innovativeness	Verhees and Meulenbergh (2004)

**Table 2: Information of Samples**

Characteristics	Percentage
<b>Product Focus</b>	
Metal Product (average annual revenue = £11,040 Millions)	35.7
Machinery and Equipment (average annual revenue = £11,009 Millions)	25.9
Chemical Product (average annual revenue = £13,571 Millions)	10.7
Others (average annual revenue = £9,446 Millions)	27.7
<b>Age (Years)</b>	
Less than 20	27.4
21 ~ 40	40.6
41 and above	31.9
<b>Employee</b>	
0 ~ 10 (Micro)	5.5
11 ~ 50 (Small)	46.6
51 ~ 250 (Medium)	47.9



**Table 3: Descriptive Statistics, Correlations and Reliabilities**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Metal Product	---														
2. Machinery and Equipment	-.441*	---													
3. Chemical Product	-.258*	-.205*	---												
4. Firm Size (Revenue)	-.068	.040	.050	---											
5. Firm Employee	-.059	.073	.045	.625*	---										
6. Firm Age	-.034	.057	.112*	.242*	.347*	---									
7. Competitive Intensity	-.003	-.070	-.038	.054	-.006	-.169*	---								
8. Market Turbulence	-.044	-.026	-.069	-.015	-.046	-.088	.360*	---							
9. Technology Turbulence	-.051	.080	-.181*	.019	-.003	-.202*	.272*	.465*	---						
10. Innovation Orientation	-.095	.105*	-.077	.013	.009	-.060	.109*	.233*	.334*	---					
11. Proactive Entrepreneurial Behavior	-.134*	.130*	.010	.168*	.161*	-.065	.106*	.269*	.334*	.553*	<b>.718</b>				
12. Customer Orientation	-.079	-.016	.027	.167*	.156*	-.020	.084	.204*	.257*	.446*	.519*	<b>.713</b>			
13. Competitor Orientation	-.152*	.036	.059	.167*	.120*	-.043	.152*	.193*	.122*	.266*	.356*	.461*	<b>.719</b>		
14. Innovation Capability	.001	-.014	.005	.025	.036	-.043	.015	.166*	.163*	.503*	.502*	.317*	.199*	<b>.742</b>	
15. New Product Development Program Performance	-.123*	.016	.019	.097	.073	-.024	-.051	.135*	.171*	.511*	.533*	.430*	.250*	.470*	<b>.854</b>
Mean	.357	.259	.107	6.758	1.705	1.480	2.859	2.720	3.067	3.364	3.374	3.741	3.347	3.572	3.919
Standard Deviation	.480	.439	.310	.514	.414	.343	.723	.696	.931	.696	.748	.640	.726	.634	.651
Composite Reliability	---	---	---	---	---	---	---	---	---	---	.749	.754	.805	.701	.889
Average Variance Extracted	---	---	---	---	---	---	---	---	---	---	.516	.508	.517	.550	.729

Notes:

N = 385; \*p < .05

Average Variance Extracted (AVE) square roots are show in bold on the correlation matrix diagonal

Firm Age is measured as log(year since establishment)

Firm Size is measured as log(annual revenue £million in 2015)

Firm Employee is measured as log(employee number)

Product Focus dummies: we choose "Others" as the benchmark group

**Table 4: Findings**

Dependent Variable:	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	New Product Development Program Performance			Innovation Capability			
<b>Control Variables:</b>							
Metal Product	-.142(-2.009)*	-.126(-1.927)†	-.140(-2.164)*	.081(1.225)	.092(1.377)	.073(1.092)	.080(1.193)
Machinery and Equipment	-.139(-1.823)†	-.165(-2.318)*	-.152(-2.157)*	-.078(-1.082)	-.068(-.937)	-.076(-1.055)	-.073(-1.008)
Chemical Product	.022(.220)	-.037(-.388)	-.045(-.485)	.051(.528)	.053(.547)	.030(.313)	.034(.357)
Firm Size	.108(1.560)	.069(1.075)	.074(1.169)	-.029(-.451)	-.032(-.491)	-.040(-.610)	-.038(-.582)
Firm Employees	.050(.567)	-.021(-.256)	-.023(-.283)	.011(.131)	.012(.147)	-.010(-.118)	-.006(-.067)
Firm Age	-.082(-.917)	-.015(-.181)	-.012(-.147)	-.018(-.213)	-.015(-.173)	-.008(-.092)	-.007(-.080)
Competitive Intensity	-.133(-3.170)**	-.118(-3.029)**	-.109(-2.838)**	-.051(-1.293)	-.048(-1.210)	-.048(-1.212)	-.046(-1.155)
Market Turbulence	.054(1.152)	.021(.474)	.013(.292)	.048(1.070)	.049(1.085)	.036(.798)	.038(.830)
Technology Turbulence	.006(.173)	-.021(-.627)	-.014(-.433)	-.039(-1.155)	-.037(-1.069)	-.037(-1.094)	-.036(-1.031)
Innovation Orientation	.474(11.159)***	.304(6.688)***	.252(5.317)***	.306(6.667)***	.305(6.449)***	.301(6.380)***	.304(6.418)***
<b>Independent Variable:</b>							
Proactive Entrepreneurial Behavior (PEB)		.329(7.511)***	-.354(-1.585)	-.290(-1.272)	.323(6.534)***	.325(6.662)***	.333(6.689)***
PEB Squared		.109(3.268)**	.094(2.831)**	.088(2.612)**	.091(1.883)†	.100(2.568)*	.106(2.168)*
<b>Mediator:</b>							
Innovation capability			.171(3.452)**				
<b>Moderator and Interaction:</b>							
Customer Orientation (CO)					.052(.886)	.014(.262)	.043(.691)
Competitor Orientation (CompO)					.008(.181)	.060(1.236)	.040(.738)
PEB x CO					-.034(-.538)		-.012(-.182)
PEB x CompO						-.077(-1.590)	-.085(-1.640)
PEB Squared x CO					-.057(-1.675)†		-.043(-.931)
PEB Squared x CompO						-.072(-2.034)*	-.042(-.825)
Constant	1.929(4.398)***	2.862(6.555)***	2.507(4.738)***	2.803(5.361)***	2.816(6.227)***	2.959(6.564)***	2.909(6.380)***
<b>Model Statistics</b>							
F-Value	16.631	21.435	21.260	17.743	13.453	13.717	12.205
P-Value	.000	.000	.000	.000	.000	.000	.000
R-Square	.299	.399	.417	.354	.359	.364	.365

Note:

\*\*\* p < 0.001; \*\* p < 0.010; \* p < 0.050; † p < 0.100

Unstandardized Coefficients are reported with t-value in parathions; Bootstrap N = 10000; BLLCI = bootstrap lower-level confidence interval; BULCI = bootstrap upper-level confidence interval

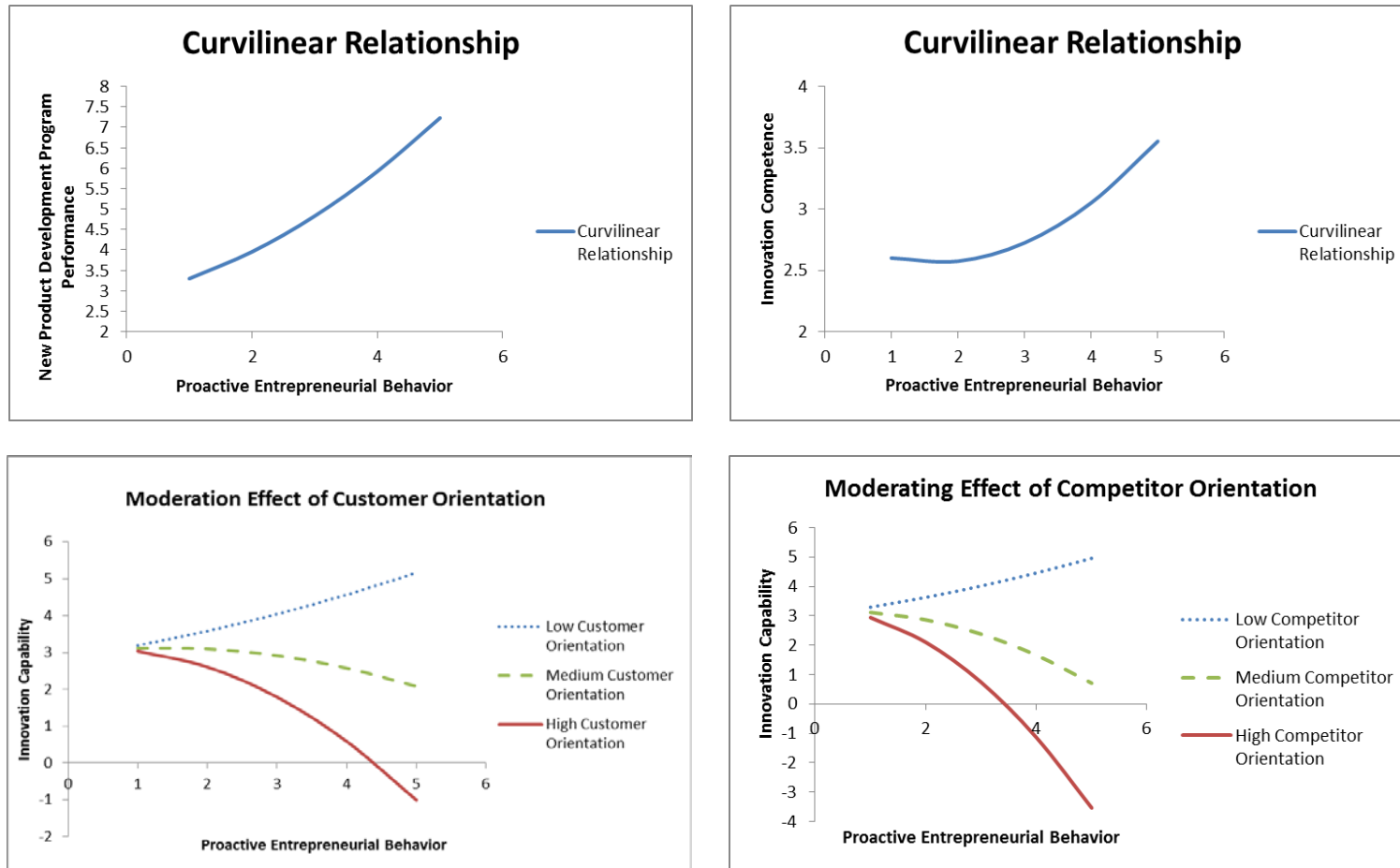
Model 4 and Model 3 Instantaneous Indirect Effect: Proactive Entrepreneurial Behavior → Innovation capability → New Product Development Program Performance

25<sup>th</sup> percentiles (relatively low) instantaneous indirect effect = .029\* BLLCI (.009) ~ BULCI (.064)

50<sup>th</sup> percentiles (relatively moderate) instantaneous indirect effect = .052\* BLLCI (.022) ~ BULCI (.092)

75<sup>th</sup> percentiles (relatively high) instantaneous indirect effect = .074\* BLLCI (.031) ~ BULCI (.135)

**Figure 2: Graphical Representation - Moderating Effects**



## Appendix 1: Measurement and Factor Loading

Measurement	Loading*
<b>Proactive Entrepreneurial Behavior</b>	
We typically initiate actions to which our competitors then respond.	.437
We are very often the first business to introduce new products in our industry	.865
When facing uncertainty, we typically adopt a proactive posture in order to seize potential opportunities.	.780
<b>Customer Orientation</b>	
We regularly meet with our customers to learn about their current and potential needs regarding new products.	.796
We constantly monitor and reinforce our understanding of the current and future needs of our customers.	.723
We regularly use market research techniques to gather customer information to understand their current and potential needs.	---
We possess a thorough knowledge about our emerging customers and their needs.	.606
<b>Competitor Orientation</b>	
We regularly collect and utilise information about the products and strategies of our competitors.	.554
We systematically collect and analyse information about potential competitor activities.	.841
Managers in this firm regularly share information about our current and future competitors.	.844
Our knowledge of our current and potential competitors' strengths and weaknesses is very thorough.	.584
<b>Innovation Capability</b>	
Compared to our competitors, our company is better at product/service innovation.	.873
Compared to our competitors, our company is better at production process innovation.	.581
Compared to our competitors, our company is better at managerial innovation.	---
<b>New Product Development Performance</b>	
Our new products have contributed to the success of our firm in terms of increased profitability.	.877
Our new products have contributed to the success of our firm in terms of revenue generation.	.892
Our new products have contributed to the success of our firm in terms of improving our market share.	.788

\* Factor loadings are standardized

--- Items deleted due to low factor loading