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# Radical Product Innovation and Export Behaviour in Small and Medium Enterprises: The Roles of Growth Expectation and Customer Portfolio Breadth

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**Received:** 23 October 2024 | **Revised:** 9 April 2026 | **Accepted:** 22 September 2026

**Keywords:** customer strategy | exports | growth | innovation | internationalisation | SMEs

## ABSTRACT

Drawing on the theory of the growth of the firm, this study examines the relationship between radical product innovation and export behaviour in small and medium-sized enterprises (SMEs). Utilising data from the UK Longitudinal Small Business Surveys (LSBS) for the period 2015–2017, this study shows that SMEs that engage in radical product innovation develop heightened growth expectations, which in turn drive export behaviour. The findings reveal a nonlinear moderation effect of customer portfolio breadth on the relationship between radical product innovation and growth expectation. This effect is strongest when SMEs target either a single customer group or a highly diversified customer base. The study contributes to the literature by elucidating the mechanisms through which innovation influences SMEs' internationalisation and highlighting customer portfolio composition's vital role. These insights offer valuable theoretical contributions and practical implications for SME managers seeking to leverage innovation for international expansion. This research also emphasises the importance of strategic customer targeting for innovation outcome optimisation.

## 1 | Introduction

Radical product innovation[1] and exporting are widely recognised as important drivers of firm growth, yet their interplay remains only partially understood in the small and medium-sized enterprises (SMEs) context (Audretsch and Belitski 2023; Cassiman and Golovko 2011; Love and Roper 2015). For resource-constrained SMEs, radical product innovation can create distinctive competitive advantages that relax the domestic market limits, while exporting provides an accessible route to international expansion that avoids the fixed costs and risks associated with foreign direct investment or acquisitions (Ko et al. 2022; Lu and Beamish 2006). On the other hand, exporting can extend product lifecycles through market diversification, reduce dependence on a volatile domestic demand, enable production-related economies of scale and expose firms to knowledge from diverse environments (Haddoud et al. 2021; Love and Roper 2015; Steinhäuser et al. 2021). Despite these complementarities, many innovative SMEs fail to export and many exporters do not rely on radical product innovation, which suggests that the relationship between radical innovation and exporting is neither automatic nor straightforward (Love and Roper 2015).

This pattern raises a central question for the SME growth research: when and how does radical product innovation actually translate into export behaviour? Previous studies often treated radical product innovation and exporting as separate growth strategies or focused on establishing direct associations between the two (e.g., Añón Higón and Driffield 2011; Henley and Song 2020; Tavassoli 2017). Such approaches overlook the internal decision processes that connect innovation to internationalisation and the external conditions that strengthen or weaken

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this connection. Addressing this gap requires a theoretical framework that specifies the mechanisms through which radical innovation leads to exporting and the boundary conditions under which this mechanism operates.

Penrose (1959)'s theory of the growth of the firm (TGF) provides such a framework. TGF conceptualises firm growth as a path-dependent process, in which the managerial perceptions of productive opportunities shape the expectations about future expansion and guide the allocation of scarce resources to particular growth paths (Kor et al. 2016; Penrose 1959). From this perspective, radical product innovation can be viewed as a powerful generator of new productive opportunities because it creates novel, distinctive offerings that can open up markets beyond the firm's existing customer base (Kyläheiko et al. 2011; Tiberius et al. 2021). Exporting represents a key growth path through which SMEs seek to realise these opportunities, especially when the domestic markets are saturated or international customers value the uniqueness of innovative products (Ko et al. 2022; Lu and Beamish 2006). Crucially, Penrose emphasises that growth driven, not by opportunities per se, but by managers' growth expectations, based on these opportunities, and their subsequent decisions about how to mobilise resources (Doern 2009; Penrose 1959; Wiklund et al. 2003).

Building on this logic, this study argues that growth expectations constitute the key mediating mechanism through which radical product innovation shapes SMEs' export behaviour. Radical product innovation can expand managers' perceived opportunity set by signalling the potential to reach new customer segments, command premium prices, or enhance reputations (Castaño et al. 2016; Henley and Song 2020). These perceptions are captured by growth expectations, which reflect managers' anticipatory assessments of future sales growth and their willingness to commit resources to expansion. Under TGF, such expectations are central to the decision to pursue exporting as a growth path because SMEs must judge whether the anticipated returns from entering foreign markets justify the associated investments and risks (Lockett et al. 2011). Accordingly, we conceptualise growth expectations as the Penrosean mechanism through which radical product innovation translates into export behaviour.

Simultaneously, TGF highlights that firms learn about and evaluate growth opportunities through their interactions with their external stakeholders, particularly their customers (Kor et al. 2016; Penrose 1959). For SMEs, which often lack formal market research capabilities, customer relationships are a primary market learning channel and important lens through which managers interpret their innovations' commercial potential (Bianchi et al. 2017; Knight and Cavusgil 2004). We therefore introduce customer portfolio breadth, defined as the number and type of customer groups served, as a critical boundary condition that shapes how radical product innovation affects growth expectations. A highly focused customer portfolio allows SMEs to develop deep knowledge of a specific segment, which can strengthen their confidence in the export potential of radical innovations tailored to that niche. Conversely, a highly diversified portfolio exposes SMEs to heterogeneous demands and usage contexts, which can broaden the perceived opportunities for the multi-channel scaling of innovations internationally (Denoo et al. 2022; Zahra and George 2002). In contrast, moderate levels of customer portfolio breadth may dilute both the depth and breadth of learning, which will reduce the growth signals' clarity and weaken the expectation-formation process (Du 2021; Weinstein 2013).

The SME context is central to this reasoning rather than incidental. SMEs typically operate under severe financial and organisational constraints, which limits their ability to pursue multiple growth paths in parallel (Hashmi et al. 2022; Ringo et al. 2023). They tend to rely on discrete strategic moves, such as radical product launches, rather than continuous R&D programmes, and frequently employ exporting rather than foreign direct investment as their primary internationalisation mode (Ko et al. 2022; Lu and Beamish 2006). SMEs' strategic planning processes are less formalised and more dependent on their managers' subjective growth expectations (Doern 2009; Wiklund et al. 2003). Moreover, international opportunities knowledge is concentrated on customer interactions rather than within dedicated research departments, which makes the customer portfolio structure an important determinant of how innovation is interpreted and commercialised (Bianchi et al. 2017; Denoo et al. 2022). Together, these features make SMEs an appropriate, theoretically meaningful context for examining how radical product innovation, growth expectations and customer portfolio breadth jointly shape export behaviour.

Against this background, the present study develops and tests a TGF-based model that links radical product innovation to SME export behaviour through growth expectations and examines how this mechanism is conditioned by customer portfolio breadth. Using panel data from the UK Longitudinal Small Business Surveys (LSBS) for the period 2015–2017, we investigate whether SMEs that undertake radical product innovation report higher growth expectations and whether these expectations make subsequent export behaviour more likely. We also test whether customer portfolio breadth moderates the impact of radical product innovation on growth expectations in a nonlinear manner, such that innovation's positive effect on expectations is strongest at very low and very high levels of breadth.

This research makes three main contributions. First, it advances the innovation-for-exporting literature (e.g., Henley and Song 2020; Saridakis et al. 2019) by identifying growth expectations as the core Penrosean mechanism linking radical product innovation to export behaviour, thereby moving beyond studies that focus solely on the direct effects or productivity-based self-selection related to exporting (Azar and Ciabuschi 2017; Cassiman and Golovko 2011). Second, it extends the SME growth and marketing research by theorising and demonstrating customer portfolio breadth's U-shaped moderating role on the radical innovation/growth expectation relationship, thereby integrating insights in the customer portfolio strategies with TGF-based accounts of knowledge accumulation and opportunity recognition (e.g., Denoo et al. 2022; Falahat et al. 2020; Liu, Gu, and Liu 2022). Third, it contributes to the TGF literature by applying Penrose's ideas to the specific challenge of SME internationalisation by articulating how internal expectations and external customer structures jointly shape the translation of innovation into export behaviour (Kor et al. 2016; Penrose 1959).



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The remainder of the article is structured as follows. Section 2 reviews the relevant literature and develops the TGF-based theoretical framework, articulating hypotheses on growth expectations' mediating role and customer portfolio breadth's moderating effect. Section 3 describes the data, variables and empirical strategy. Section 4 presents the empirical findings on mediation and moderated mediation. Section 5 reports the robustness checks. Section 6 discusses the theoretical and managerial implications, outlines the limitations and suggests directions for future research.

## 2 | Theory and Hypotheses

### 2.1 | Literature Background

Research on SME innovation and export behaviour has established that both activities contribute to firm growth, although the mechanisms that connect them remain contested (Love and Roper 2015; Martínez-Román et al. 2019). One research stream, that is often labelled 'learning-by-exporting', argues that participation in international markets provides access to diverse knowledge sources, such as customer feedback, competitor signals, and technological trends, which stimulate subsequent innovation (Golovko and Valentini 2014; Love and Ganotakis 2013). From this perspective, exporting is a driver rather than a consequence of innovation. SMEs that enter foreign markets benefit from unique learning opportunities that help them to adapt and upgrade their products over time (Gkypali et al. 2021).

A second research stream, to which this study contributes, examines how innovation influences SMEs' export behaviour. Within this stream, the dominant 'self-selection' perspective suggests that innovation improves firm-level productivity, enabling firms to self-select exporting as they become more competitive in the international markets (Azar and Ciabuschi 2017; Cassiman and Golovko 2011; Edeh et al. 2020). Empirical findings increasingly challenge the universality of this mechanism, however. Henley and Song (2020), for example, find no direct link between SMEs' radical product innovation and productivity, which undermines the assumption that productivity gains are the primary channel through which innovation leads to export behaviour. Other studies show that revenue growth following innovation may reflect higher markups compared to productivity improvements (Dai and Cheng 2018), which implies that alternative mechanisms beyond productivity may link innovation to export behaviour.

The innovation-for-exporting perspective responds to these limitations by framing innovation as a strategic means of entering and competing in the international markets (e.g., Castaño et al. 2016; Nassimbeni 2001; Raymond and St-Pierre 2013). Rather than focusing on productivity, this perspective argues that innovation enhances firms' ability to meet the international customer demands, develop unique value propositions and overcome the entry barriers (Añón Higón and Driffield 2011; Saridakis et al. 2019). The approach is especially relevant for SMEs, which often lack formal R&D departments and structured innovation processes (Tavassoli 2017). For such firms, radical product innovation represents a discrete strategic choice that can offset the liability of smallness by targeting niche international segments where differentiation is valued and scale is less critical (Simon 2009). Empirical work shows that radical innovators are more likely to export and internationalise than non-innovators, including in less-developed economies where the institutional voids and resource constraints are pronounced (Hashmi et al. 2022; Nguyen et al. 2008; Saridakis et al. 2019).

A literature review revealed two specific gaps that motivated the present study and underpin the proposed theoretical model. The first gap concerns the mechanisms that connect radical product innovation to export behaviour. While the innovation-for-exporting literature demonstrates that radical product innovation helps SMEs to differentiate their offerings and address unmet international demands (D'Angelo 2012; Love and Roper 2015; Zaman and Tanewski 2024), it rarely specifies how these advantages are translated into concrete export decisions. Several studies imply that growth-oriented managers are more likely to leverage innovation for export behaviour (e.g., Añón Higón and Driffield 2011; Nassimbeni 2001), yet neither theorise nor measure growth expectations as a distinct mechanism. When SMEs introduce radical innovations, these offerings can shift the managerial perceptions of growth potential and influence the strategic orientation (Cassiman and Golovko 2011). Such expectations then shape whether managers commit resources to exporting as a way to scale innovations beyond the domestic markets. An examination of growth expectations as a mediating mechanism therefore may help to clarify how SMEs translate radical innovation into international expansion.

The second gap relates to the innovation/export relationship's boundary conditions. The existing studies often treat radical innovation's impact on exports as uniform across SMEs, while empirical evidence points to important contextual contingencies. For example, Nguyen et al. (2008) show that the export effects of radical product innovation differ by firm size and industry, while Hashmi et al. (2022) found that institutional environments can strengthen or weaken the innovation/export behaviour link. Simultaneously, qualitative and survey-based work suggests that customer-related factors strongly influence innovations' successful commercialisation in foreign markets (Bianchi et al. 2017; Knight and Cavusgil 2004). This indicates that SMEs' customer bases' structures may condition how innovation translates into export success, yet this aspect has been neither systematically theorised nor tested. In light of these observations, we examine customer portfolio breadth as a boundary condition that shapes how radical innovation affects growth expectations and so, indirectly, export behaviour. Taken together, these two gaps motivate our focus on growth expectations as the mediating mechanism and customer portfolio breadth as the key boundary condition in the SME context.

### 2.2 | SME Innovation, Growth Expectations and Export Behaviour

TGF provides a coherent theoretical lens for specifying how radical product innovation influences SME export behaviour via growth expectations (Figure 1). Penrose (1959) conceptualises firm growth as a function of the firm's resource base and the productive opportunity set as perceived by the managers. Entrepreneurial ideas and innovations expand this opportunity set by suggesting new ways in which resources might be



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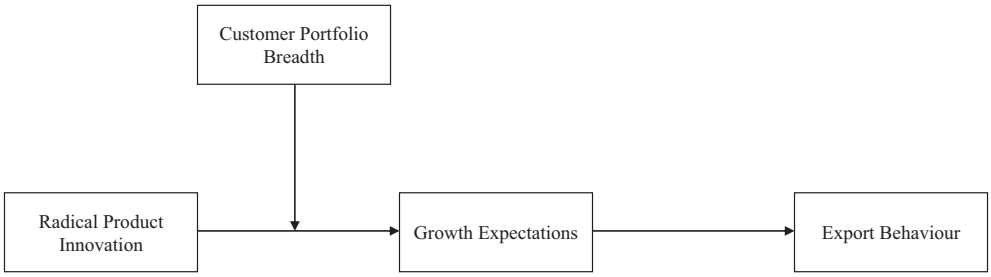



**FIGURE 1** | Conceptual framework.

combined and deployed (Kor et al. 2016; Kyläheiko et al. 2011). Managers form expectations about future growth based on these perceived opportunities, which expectations guide the selection of specific growth paths, such as entering new markets or extending existing ones (Denoo et al. 2022; Lockett et al. 2011). Under this framework, growth expectations are not merely attitudes but central decision variables that connect innovation to concrete expansion behaviour.

Radical product innovation fits naturally into this Penrosean logic as an antecedent of SME growth. When SMEs successfully introduce products or services that are new to the market, they create distinctive competitive advantages that can change their opportunity set both domestically and internationally (Tiberius et al. 2021). Such innovations can open up new market segments, enable premium pricing, or stimulate complementary demand, thereby increasing the scope for firm growth. SMEs often face severe resource constraints, however, that limit their ability to scale these innovations. They may lack the financial capacity, managerial capabilities, or network relationships needed to exploit opportunities fully in their domestic market alone (Haddoud et al. 2021; Ringo et al. 2023). As a result, radical innovation does not automatically produce growth. Rather, it alters the managers' perceptions of what is achievable and desirable, which is reflected in their growth expectations (Castaño et al. 2016).

In TGF, export behaviour appears to offer a natural growth path for SMEs seeking to realise innovation-driven opportunities under resource constraints. Exporting allows firms to reach new customers without incurring the fixed costs associated with establishing foreign affiliates, and can therefore be seen as a form of organic growth with a comparatively lower financial risk (Lockett et al. 2011; Love and Roper 2015; Lu and Beamish 2006). Empirical studies show that technology- and market-based innovations are positively associated with SMEs' both economic and strategic export performance (Hashmi et al. 2022). Novel products can also reduce the liability of foreignness by differentiating the firm from its local competitors and attracting attention in new markets through uniqueness and perceived quality (Henley and Song 2020; Nassimbeni 2001). Nonetheless, the choice to export remains contingent on the managers' expectations about whether the returns from international expansion justify the required investment in adapting products, building relationships and managing cross-border risks.

Within this TGF framework, we posit that growth expectations mediate the relationship between radical product innovation and SME export behaviour. According to Penrose, managers' perceptions of the firm's productive opportunity set translate into concrete growth moves through their expectations about the scale and direction of the firm's future expansion (Doern 2009; Lockett et al. 2011). We therefore treat growth expectations as an observable proxy for this central Penrosean construct, because they capture the managers' assessments of whether the opportunities created by radical product innovation can be turned into sales growth. Radical innovations expand the perceived opportunity set by signalling that the firm can access new or larger markets and create additional value. Managers who interpret these signals as credible and attainable form higher growth expectations, which in turn increase their propensity to choose exporting as a way to realise innovation's potential. Exporting is an appropriate growth outcome in this context because it is the dominant, resource-feasible internationalisation path that is available to SMEs and directly reflects the realisation of opportunity perceptions in TGF terms (Kor et al. 2016; Lu and Beamish 2006). This logic supports the evidence that innovative firms tend to have more ambitious growth expectations, which are associated with subsequent growth-oriented actions (Castaño et al. 2016; Wiklund et al. 2003). Formally, we hypothesise:

**Hypothesis 1.** *In the SME context, growth expectations mediate the relationship between radical product innovation and export behaviour.*

### 2.3 | Customer Portfolio Breadth

TGF establishes that firm growth fundamentally depends on knowledge accumulation and its application to identify and exploit new opportunities (Kor et al. 2016; Penrose 1959). Knowledge is built not only through internal learning mechanisms, but also through interactions with the external stakeholders, notably the customers, who provide information about their needs, usage contexts, and market developments (Bruneel et al. 2010; Kale and Singh 2007). Customer portfolio breadth refers to a firm's strategic approach to engaging diverse customer groups and delivering value to them (Denoo et al. 2022). It captures how widely an SME's customer relationships spread across distinct groups, such as private-sector businesses, individual consumers, charities, and public-sector organisations. Managing the customer portfolio breadth entails segmenting the markets and positioning the offerings to target specific groups, or potentially even multiple groups simultaneously (Balau et al. 2020; Dibb and Simkin 1991). In this study, we treat customer portfolio breadth as an observable manifestation of the knowledge-accumulation channel highlighted in TGF, because



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different levels of breadth shape how SMEs acquire and interpret market knowledge that is relevant for their growth decisions. A focused customer portfolio concentrates the marketing efforts on a single sector, directing resources to promote and sell products and/or services to one well-defined group (Weinstein 2013). This approach allows firms to customise their products and/or services, potentially boosting their customer loyalty and profit margins (Dalgic 2006). Conversely, a diversifying customer portfolio targets multiple sectors, reducing dependence on any single market and expanding the revenue streams (Gary 2005; Kenny 2009). This broader reach can build firms' brand recognition and strengthen their market position.

According to TGF, knowledge accumulation drives firm growth because it shapes the managers' perceptions of productive opportunities (Kor et al. 2016; Penrose 1959). A focused customer portfolio facilitates specialised knowledge development, as firms deepen their expertise through repeated interactions with a well-defined group (Dalgic 2006; Weinstein 2013). This knowledge accumulates over time, enabling firms to refine their capabilities related to identifying their customers' needs, incorporating feedback and enhancing their radical product innovation (Zahra and George 2002). A growing ability to understand and anticipate market-specific challenges may also enhance the discovery of unaddressed needs, fostering the development of new products that are tailored to niche markets. By contrast, a diversified customer portfolio provides broad but heterogeneous knowledge through interactions across multiple sectors that will expose firms to varying needs, preferences and problem-solving approaches (Audretsch et al. 2024; Gary 2005; Kenny 2009). This diversity enhances firms' ability to recombine insights from different markets, fostering radical innovations that transcend the industry boundaries (Balau et al. 2020; Zahra and George 2002). In TGF terms, different levels of customer portfolio breadth therefore shape how managers interpret the opportunities created by radical product innovation and how strongly these opportunities are translated into growth expectations.

Moderate levels of customer portfolio breadth, however, lack the benefits of the extremes. When SMEs transition from a focused to a moderately diversified customer portfolio, their knowledge accumulation can become fragmented, and so weaken their ability to develop deep expertise within a single segment while failing to achieve the breadth necessary for effective cross-sectoral learning (Weinstein 2013). Resource diffusion across multiple but insufficiently distinct sectors may limit firms' ability to extract meaningful patterns or apply knowledge effectively to radical innovation processes (Du 2021). Similarly, SMEs that shift from a diversified to a less broad customer portfolio lose access to varied external knowledge sources, thereby reducing their capacity to develop novel products and adapt to the changing market conditions (Audretsch et al. 2024; Gary 2005). From a TGF perspective, these intermediate configurations generate weaker, noisier signals about the growth opportunities associated with radical innovation, which in turn dampens innovation's effect on the managers' growth expectations. By contrast, very low and very high levels of customer portfolio breadth either concentrate learning in a single segment or expose the firm to a wide variety of market conditions, both of which can sharpen the managers' interpretations of innovation-driven opportunities and strengthen their expectations of future growth.

Thus, in alignment with the TGF principles, we argue that the customer portfolio breadth's effect on the innovation/expectations link is maximised at its extremes. A highly-focused strategy facilitates deep, specialised knowledge accumulation, and strengthens radical innovation by enhancing firms' ability to meet well-defined customer needs. A highly-diversified strategy enables firms to access heterogeneous knowledge sources, enabling creative recombination that enhances innovation potential and perceived scalability. In contrast, moderate strategies lack both the depth of focused learning and the breadth of diversified knowledge acquisition, leading to weaker radical innovation effects on growth expectations. Therefore, this study hypothesises that customer portfolio breadth moderates the relationship between radical innovation and growth expectations in a U-shaped pattern.

**Hypothesis 2.** *In the SME context, the moderation effect of customer portfolio breadth on the radical product innovation/growth expectations relationship exhibits a U-shaped pattern.*

## 3 | Research Method

### 3.1 | Sample and Survey Method

The primary data source was the UK Longitudinal Small Business Surveys (LSBS) covering the period from 2015 to 2017, with an extension to 2018 included in one of the robustness checks. The cut-off point was 2017 as LSBS collected information on customer portfolio breadth for a three-period mediation analysis only in 2015. Commissioned by the Department for Business, Energy, and Industrial Strategy (BEIS), LSBS is a comprehensive survey that targets the owners and managers of SMEs in the UK, which are defined as businesses with fewer than 250 employees.

The 2015 LSBS sampled 15,502 businesses, representing 0.1% of all UK SMEs. Of these, 7279 businesses were re-interviewed in 2016, and 5315 in 2017 (having participated in 2015 and/or 2016), leading to an unbalanced panel across the sample period. The LSBS builds upon a series of Small Business Surveys (SBS) that have been conducted since 2003, although earlier SBS iterations captured only cross-sectional data. These surveys document comprehensively the drivers and barriers to SME growth, alongside various dimensions of economic health and business behaviour, including innovation activities, export behaviour, financing strategies, and training provision. The scholarly community has extensively utilised both the SBS and LSBS datasets for entrepreneurship and small business research, as evidenced in significant works by Cowling et al. (2015) and Liu, Liu, and Ko (2022).

### 3.2 | Variable Measurement

The merged surveys resulted in 6838 observations after eliminating missing values, although not every observation was relevant to the study. The primary dependent variable is *export behaviour*, which is an indicator variable that equals one if the firm has sold goods or services outside the UK within the past 12 months, and zero otherwise. The inclusion of firms that were



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already exporting prior to the observation period may confound the estimation of the mechanisms theorised in this study. Established exporters differ systematically from non-exporters in terms of their capabilities, market knowledge, and strategic orientation. These pre-existing characteristics may both influence their current exporting behaviour and correlate with the explanatory variables, thereby obscuring the causal pathways of interest.

To isolate the determinants of export behaviour, the estimation sample was restricted to firms that did not export in 2015. This design allowed a cleaner test of whether the identified variables and their interactions increased the likelihood of initiating export behaviour by 2017. By focusing on export decisions rather than continuation, the analysis aligns more closely with the theoretical model and reduces concerns that the results are driven by prior export experience or path dependence. The final effective number of observations for the econometric analyses was 5203. Among these firms, 59% were micro-enterprises or zero-employee businesses (0–9 employees), 27% were small enterprises (10–49 employees), and 14% were medium-sized enterprises (50–249 employees).

The independent variable (IV) employed in this study is *radical product innovation*, measured as a dummy variable. It is equal to one if a firm introduced new or significantly improved goods or services at the market level, and zero otherwise. The mediator variable, *growth expectations*, is defined as a continuous variable indicating the self-reported predicted percentage growth in sales over the next 3 years, following a positive answer to the screening question 'Do you want to increase your business's sales?', and 0 if the response to this question was negative.[2] *Customer portfolio breadth* is measured by a continuous variable that represents the number of customer categories that the firm serves, including private-sector businesses, individual consumers, charities or third-sector organisations, and the public sector.[3] The minimum value of this variable is 0 (no customer), and the maximum is 4.

The analysis controls for a set of firm and owner characteristics that the prior research identifies as key determinants of export behaviour (Haddoud et al. 2021). The firm-level controls include size, age, sector, and legal structure. These attributes capture differences in resource endowment, organisational maturity, and regulatory positioning, all of which shape a firm's capacity to initiate export behaviour (Golovko and Valentini 2014; Ko et al. 2022; Love and Roper 2015). Owner characteristics, specifically gender and ethnic origin, are included to account for heterogeneity within access to finance, information, and business networks. Prior studies show that such structural conditions can constrain opportunity recognition and international expansion, independent of firm-level capabilities (Marques 2015). The presence of a formal business plan captures the firm's strategic orientation, reflecting the extent to which activities are deliberately structured and aligned with the market opportunities (Zott and Amit 2008). This strategic dimension has been consistently linked to export engagement and subsequent performance outcomes (Chen et al. 2016). These control variables collectively strengthen our analytical framework's robustness by accounting for export behaviour's established determinants beyond our focal innovation variables. Detailed definitions of all measurements are reported in Appendix 1.

## 4 | Findings

The system of equations is estimated as follows:

$$\begin{aligned} \textit{Growth Expectations}_{t-1} = {} & i_M + \alpha_1 \textit{Radical Product Innovation}_{t-2} \\ & + \alpha_2 \textit{Customer Portfolio Breadth}_{t-2} \\ & + \alpha_3 \left(\textit{Radical Product Innovation}_{t-2} * \textit{Customer Portfolio Breadth}_{t-2}\right) \\ & + \alpha_3 \left(\textit{Radical Product Innovation}_{t-2} * \textit{Customer Portfolio Breadth}^2_{t-2}\right) \\ & + \alpha_4 \textit{Controls}_{t-1} + \varepsilon_M \end{aligned} \tag{1}$$

$$\begin{aligned} \textit{Export Behaviour}_t = {} & i_Y + \beta_1 \textit{Radical Product Innovation}_{t-2} \\ & + \beta_2 \textit{Growth Expectations}_{t-1} \\ & + \beta_3 \textit{Controls}_{t-1} + \varepsilon_Y \end{aligned} \tag{2}$$

In these equations, $t$ represents the year 2017. Lagged IVs are employed to mitigate concerns about reverse causality, as they ensure that the explanatory variables precede the observed export entry outcome (Besser et al. 2021). While this approach may not fully eliminate endogeneity, it reduces the likelihood that contemporaneous feedback effects drive the results. In addition, firm fixed effects are included to control for time-invariant unobserved heterogeneity, such as persistent differences in managerial capability or organisational culture, which may correlate with the regressors. By accounting for these latent factors, the specification provides a more conservative estimate of the relationships of interest. The terms in brackets denote potential moderation effects, such as the quadratic effect of customer portfolio breadth. The indirect effect of the IV on the dependent variable through the mediator is expressed as a linear function of the relevant coefficient. All models are estimated using generalised structural equation modelling estimators. Subsequently, bootstrapping is employed, utilising 1000 repetitions, to estimate the direct, indirect, and total effects of the IV on the dependent variable, along with their respective standard errors and confidence intervals. For the moderated mediation models, bootstrap estimates of the standard errors and confidence intervals are also provided for both treated and non-treated effects (indirect and total) and their divergences. Bootstrapping standard errors do not rely on normality assumptions, and the biased-corrected and percentile confidence intervals are asymmetrical, thereby more accurately reflecting the sampling distribution of the conditional indirect effects.



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Table 1 presents the descriptive statistics and correlation coefficients for the key variables. Sample weights were applied so that the statistics represent the whole UK business population.[4] The correlation analysis reveals a predominantly weak association pattern among the variables, with most significant correlations displaying absolute values below 0.3. This modest correlation structure is further substantiated by the variance inflation factor analysis, which yields values considerably below the critical threshold of 5. Such findings provide robust evidence to soothe concerns about multicollinearity within the dataset, in line with the established statistical guidelines (Kutner et al. 2005). The sample SMEs in this study had an average establishment age of over 17 years, were primarily operated by male managers, and employed two individuals, excluding the owner. Among the non-exporters observed in 2015, 5% transitioned into becoming exporters within a 2-year period. Additionally, the data reveal notable innovation patterns within the sample. Over 10% of firms engaged in radical product innovation, projecting a 15% sales growth. These innovative firms distributed products across an average of two distinct customer segments. Growth expectations differ substantially between radical innovators (mean = 0.28) and non-radical innovators (mean = 0.16), as documented in Appendix 2.

The coefficient estimates for the generalised structural equation modelling models are presented in Table 2. Complementarily, Table 3 showcases the results obtained from bootstrapping, which assess the direct, indirect, and total effects within the mediation and moderated-mediation models. The first observation reveals the absence of significant associations between growth expectations or export behaviour, on the one hand, and firm size, on the other. Thus, there is no evidence suggesting that smaller firms bias the findings. SMEs' export behaviour varies across different sectors and regions. Firms that offer business services are more likely to engage in export behaviour, although their growth expectations do not differ markedly from those in other sectors. In addition, firms located in more developed regions of the UK, particularly London and the East of England, exhibit a higher likelihood of engaging in export activity (see Appendix 4).

The results produced by Model I, which examines H1 without additional moderators, confirm the predicted relationship. Specifically, the effect of radical product innovation on growth expectations is found to be significantly positive ($\beta = 0.097$, $p = 0.000$), as does the effect of growth expectations on export behaviour ($\beta = 0.359$, $p = 0.010$). These findings have substantial economic significance. Notably, radical product innovation increases expected sales growth by 10 percentage points, marking a 67% rise from the mean. Similarly, a 10% increment in growth expectations elevates the probability of export by 0.4 percentage points, signifying an 8% increase from the mean. The direct effect of radical product innovation on export behaviour is measured at 0.308 ($p = 0.005$), yielding a marginal effect of 3%. The bootstrapping results unveil further insights. The conditional indirect effect of radical product innovation on export behaviour through growth expectations is determined as 0.038 ($p = 0.010$, 95% confidence interval (CI) = [0.009, 0.066]), while the total effect amounts to 0.347 ($p = 0.001$, 95% CI = [0.139, 0.560]). Hence, the findings strongly support H1.

**TABLE 1** | Correlation matrix for key variables.

| | Mean | SD | VIF | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Export behaviour | 0.050 | 0.217 | DV | 1 | | | | | | | | | | | | |
| (2) Radical product innovation | 0.109 | 0.312 | 1.020 | 0.037 | 1 | | | | | | | | | | | |
| (3) Growth expectations | 0.147 | 0.270 | 1.100 | 0.029 | **0.126** | 1 | | | | | | | | | | |
| (4) Customer portfolio breadth | 2.108 | 1.086 | 1.080 | **−0.112** | **0.056** | −0.003 | 1 | | | | | | | | | |
| (5) Ln(Employee number) | 0.375 | 0.811 | 1.470 | −0.003 | −0.015 | **0.051** | **0.116** | 1 | | | | | | | | |
| (6) Ln(Firm age) | 2.863 | 0.747 | 1.110 | **−0.072** | **−0.061** | **−0.201** | −0.007 | **0.110** | 1 | | | | | | | |
| (7) Transport and retail | 0.165 | 0.371 | 1.770 | −0.016 | **−0.072** | −0.036 | **0.067** | **0.193** | −0.007 | 1 | | | | | | |
| (8) Business services | 0.315 | 0.465 | 1.820 | 0.040 | **0.078** | **0.139** | 0.009 | −0.029 | **−0.041** | **−0.301** | 1 | | | | | |
| (9) Other services | 0.278 | 0.448 | 1.890 | **0.054** | **0.059** | **−0.064** | −0.027 | **−0.088** | −0.034 | **−0.276** | **−0.421** | 1 | | | | |
| (10) Ltd liability | 0.414 | 0.493 | 1.200 | **0.111** | **0.062** | **0.201** | −0.018 | **0.283** | **−0.087** | **−0.059** | **0.337** | **−0.208** | 1 | | | |
| (11) Women-led | 0.224 | 0.417 | 1.030 | 0.037 | **0.053** | −0.008 | −0.010 | −0.027 | **−0.111** | 0.000 | **−0.074** | **0.261** | **−0.078** | 1 | | |
| (12) Minority-led | 0.046 | 0.210 | 1.010 | −0.008 | −0.032 | **0.092** | −0.017 | 0.009 | **−0.059** | −0.013 | **0.073** | −0.024 | 0.035 | −0.024 | 1 | |
| (13) Business plan | 0.244 | 0.429 | 1.210 | **−0.054** | **0.130** | **0.114** | 0.027 | **0.250** | −0.009 | −0.007 | 0.026 | 0.020 | **0.175** | −0.009 | 0.023 | 1 |

*Note:* Number of observations = 5203. Correlation coefficients in bold are those with significance levels of 0.01 or less. Base category for sector = Production and Construction. Sample weights applied. Unweighted statistics are reported in Appendix 2.



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**TABLE 2** | Generalised structural equation model regressions to test hypotheses.

| | Model I | | Model II | |
|---|---|---|---|---|
| | **Growth expectations** | **Prob (export)** | **Growth expectations** | **Prob (export)** |
| **Panel A: Regression results** | | | | |
| *Predictors* | | | | |
| Radical product innovation (RPI) | 0.097 | 0.308 | 0.274 | 0.308 |
| | (0.011) | (0.110) | (0.051) | (0.110) |
| | [0.000] | [0.005] | [0.000] | [0.005] |
| Growth expectations | | 0.359 | | 0.359 |
| | | (0.139) | | (0.139) |
| | | [0.010] | | [0.010] |
| Customer portfolio breadth (CPB) | | | 0.020 | |
| | | | (0.015) | |
| | | | [0.194] | |
| Radical product innovation × CPB | | | −0.143 | |
| | | | (0.048) | |
| | | | [0.003] | |
| $CPB^2$ | | | −0.003 | |
| | | | (0.003) | |
| | | | [0.306] | |
| Radical product innovation × $CPB^2$ | | | 0.024 | |
| | | | (0.010) | |
| | | | [0.016] | |
| Constant | 0.311 | −2.012 | 0.287 | −2.012 |
| | (0.021) | (0.267) | (0.026) | (0.267) |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Control variables | Yes | Yes | Yes | Yes |
| Sector FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| *N* | 5203 | 2986 | 5203 | 2986 |
| Log likelihood | −636.01 | | −628.53 | |

| | **Turning point** | **SE** | ***p*** | **95% confidence interval** | |
|---|---|---|---|---|---|
| **Panel B: Test statistics of turning point in model II growth expectation equation** | | | | | |
| (1) RPI = 1 | 3.030 | 0.365 | < 0.001 | 2.314 | 3.747 |
| (2) RPI = 0 | 3.044 | 0.850 | < 0.001 | 1.379 | 4.709 |
| (1)–(2) | 0.002 | 0.146 | 0.988 | −0.285 | 0.289 |

*Note:* Coefficients are reported with robust standard errors in parentheses and *p*-values in brackets. Control variables include Ln(Employee number), Ln(Firm age), Industry dummies, Limited liability company, Women-led business, Ethnic minority-led business, and firm having a formal written business plan. Full regressin results are reported in Appendix 4.

Model II explores customer portfolio breadth's moderation effect on the radical product innovation/growth expectations relationship. The regression analysis incorporates both linear and quadratic terms for customer portfolio breadth to capture the anticipated nonlinear moderating effect that H2 proposes. The findings reveal a significantly negative coefficient estimate on the interaction term between customer portfolio breadth and radical product innovation ($\beta = -0.143$, $p = 0.003$), while the interaction



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**TABLE 3** | Bootstrapping results for the direct, indirect, and total effect of the mediation models.

| | Direct effect | | | Indirect effect | | | Total effect | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | *p* | [95% confidence interval] | Coef. | *p* | [95% confidence interval] | Coef. | *p* | [95% confidence interval] | Ratio of indirect to total effect |
| *Mediation effect of growth expectations only* | | | | | | | | | | |
| | 0.308 | 0.005 | 0.092–0.525 | 0.038 | 0.010 | 0.009–0.066 | 0.347 | 0.001 | 0.139–0.560 | 10.95% |
| *Moderated-mediation effect of customer portfolio breadth (CPB)* | | | | | | | | | | |
| (1) Low (−2SD) | 0.308 | 0.005 | 0.092–0.525 | 0.097 | 0.061 | −0.004 to 0.199 | 0.406 | 0.001 | 0.175–0.636 | 23.99% |
| (2) Mean | 0.308 | 0.005 | 0.092–0.525 | 0.025 | 0.051 | 0.000–0.051 | 0.334 | 0.002 | 0.121–0.546 | 7.61% |
| (3) High (+2SD) | 0.308 | 0.005 | 0.092–0.525 | 0.040 | 0.123 | −0.011 to 0.091 | 0.348 | 0.002 | 0.131–0.566 | 11.53% |
| (1)–(2) | | | | 0.072 | | 0.004–0.192 | 0.072 | | 0.007–0.192 | |
| (3)–(2) | | | | 0.015 | | −0.024 to 0.079 | 0.015 | | −0.028 to 0.073 | |

*Note:* Bootstrapping using 1000 iterations. Bias-corrected confidence intervals are reported.

term between customer portfolio breadth squared and innovation yields a significantly positive estimate ($\beta = 0.024$, $p = 0.016$). The statistical significance of the moderated U-shaped relationships is formally tested following Haans et al. (2016). The results are reported in Table 2 (Panel B). The turning point (three customer groups) is significant and falls within the range of customer portfolio breadth values (0–4) at the 95% confidence level only when the variable Radical product innovation takes the value of one. For non-innovating SMEs, there is no evidence of a U-shaped relationship or shifting turning points at any conventional significance level. These results indicate a U-shaped moderation effect on the relationship between radical product innovation and growth expectations. Figure 2 visually depicts how the marginal effect of radical product innovation on growth expectations varies with customer portfolio breadth. It demonstrates that this effect is minimised when the firm concentrates on three different markets, as opposed to when the firm focuses solely on a single market or adopts an excessively diverse customer portfolio.

To examine the conditional indirect effect in the moderated mediation model, customer portfolio breadth is fixed at its mean and two extreme levels (±2×SD). For all three customer portfolio breadth levels, the direct, indirect, and total effects are significant at or below the 5% level (except for the indirect effect under high customer portfolio breadth). At a low customer portfolio breadth level, the indirect and total effects of innovation on export behaviour are calculated as 0.097 ($p = 0.061$, 95% CI = [−0.004, 0.199]) and 0.406 ($p = 0.001$, 95% CI = [0.175, 0.636]), respectively. These values are 0.072 higher ($p < 0.005$) compared to those observed at the average customer portfolio breadth value. In summary, the results robustly support H2.

## 5 | Robustness Analyses

Despite the use of lagged IVs and restriction of the sample to non-exporters, endogeneity concerns may persist. Innovation, growth expectations and export entry may be jointly determined, giving rise to reverse causality and simultaneity bias. To address these concerns, a two-stage GMM estimation is employed in which radical product innovation is treated as endogenous. The instruments include receipt of R&D tax credits (Bloom et al. 2013) and a regional indicator for deprived areas, which captures the variations in firms' exposure to local knowledge spillover (Abramovsky and Simpson 2011). The standard tests support the instruments' validity. The results indicate that innovation remains a significant predictor of growth expectations (Appendix 5), which supports the robustness of the main findings. As an additional robustness check, a two-stage control function approach was implemented, following Li et al. (2010). In the first stage, radical product innovation was modelled using the instrumental variables and relevant controls. The residual from this estimation was then included as an additional regressor in the main models reported in Table 2, alongside the original innovation measure, to account for its endogenous component. The inclusion of the residual helped to mitigate concerns about reverse causality. The results, reported in Appendix 6, remain consistent with the main findings.

To ensure the primary results' robustness, various analyses were conducted, and the outcomes are presented in the appendices. One such analysis examined whether the results were influenced by growth-oriented SMEs' higher productivity levels. Previous studies have suggested a link between productivity and firms' internationalisation (Golovko and Valentini 2011). To address this potential confounding factor, productivity, measured by the logarithm of turnover per employee, was included as a control variable in the regression analysis. Market-level factors influence SME export outcomes, as documented by Sousa et al. (2008). Whilst the LSBS lacks direct market condition measures, we employed two proxies: entrepreneurs' perceptions of market competition as a significant business obstacle (representing the competitive intensity) and UK regional real GDP growth (capturing the broader macroeconomic conditions). These



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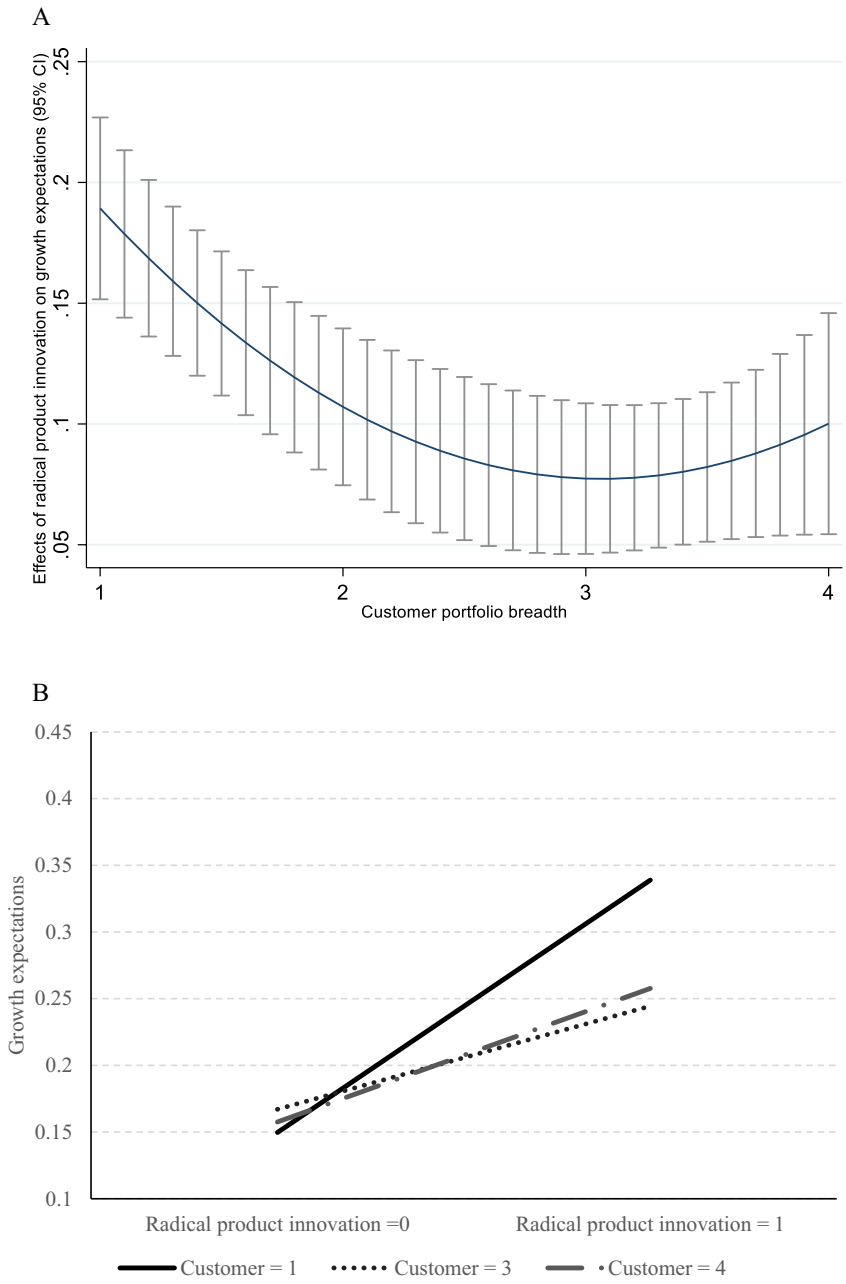



**FIGURE 2** | Graphic representation of the nonlinear moderating effect of customer portfolio breadth. Panel A: U-shape effect of customer portfolio breadth on growth expectations. Panel B: The effect of radical product innovation on growth expectations by alternative customer portfolio breadth levels.

variables allowed us to account for external market dynamics within our analytical framework. The results of this analysis (Models I and II, Appendix 7) indicate that, despite the inclusion of the extra control variable, all of the findings related to growth expectations' mediation effect and customer portfolio breadth's moderated mediation effect remain statistically significant. This suggests that the results are robust and uninfluenced by the productivity levels observed in growth-oriented SMEs.

In the primary analysis, the likelihood of a previously non-exporting firm commencing exporting in the subsequent years served as an indicator of export behaviour. While this provides a reliable measure of a notable departure from the *status quo* in terms of international strategies, it fails to consider the potential influence of growth expectations driven by innovation on the export behaviour's intensity among existing exporters. To address this limitation, an alternative measure of export behaviour was employed (Models III and IV, Appendix 7), which captured changes in the proportion of total sales derived from exporting goods or services.[5] The findings reveal that the positive association between radical product innovation and growth expectations ($\beta = 0.111$, $p = 0.000$), as well as the positive relationship between growth expectations and export behaviour ($\beta = 1.960$, $p = 0.000$), persist even when accounting for this alternative measure. A mere 1% increase in growth expectations leads to a 2% rise in exports' sales share. It is noteworthy, however, that customer portfolio breadth no longer has a significant moderating effect on the mediation model. This implies that it



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predominantly serves as an influential factor in determining the contextual boundaries for non-exporting enterprises when making decisions regarding exporting.

Similarly, it is important to recognise that firms that focus on growth and innovation may not immediately embark on export behaviour. Consequently, international strategies that solely rely on measuring actual exports might overlook SMEs that develop subsequent aspirations to engage in international trade. To address this issue, the dependent variable in Table 2 is substituted with an indicator variable that captures whether a firm intends to initiate the exporting of goods or services outside the UK (Model V, Appendix 7). The findings demonstrate that growth expectations serve as a significant mediator in the relationship between radical product innovation and export expectations ($\beta = 0.967$, $p = 0.000$), while the moderating effect of customer portfolio breadth remains consistent (as indicated by the first-stage regression of innovation on growth expectations, which aligns with the results presented in Table 2). Nevertheless, compelling evidence emerges of the enduring impact of radical product innovation on export behaviour, mediated through growth expectations and subsequently through export expectations, employing a serial multiple mediation model. To accomplish this, the sample period is extended by an additional year to create a four-period mediation model (Model VI, Appendix 7).

Lastly, this study measures customer portfolio breadth as a simple count of the customer categories that each firm serves, reflecting the LSBS dataset's structure. We were unable to extract innovation expenditure information from the dataset, preventing the use of more sophisticated measures such as innovation-to-sales ratios or a Herfindahl index for customer concentration. Our supplementary analysis examined whether customer portfolio breadth effects were driven by specific target groups (private sector, individuals, charities, the public sector). As documented in Appendix 8, this analysis revealed predominantly insignificant interaction terms between customer types and innovation, with the sole exception of charity customers. These findings substantiate our focus on overall customer portfolio breadth, as the individual customer type effects remain largely inconclusive, supporting our measurement approach within the data constraints.

## 6 | Discussion

### 6.1 | Theoretical Implications

This study makes three main theoretical contributions to the radical product innovation, SME export behaviour and TGF research streams. First, it advances the innovation-for-exporting literature by specifying and testing a Penrosean mechanism that connects radical product innovation to SME export behaviour. The previous innovation-for-exporting research has noted that a 'pursuit of growth' may link radical product innovation to export behaviour (e.g., Henley and Song 2020; Nassimbeni 2001), but has not directly examined this mechanism using large-scale longitudinal data. By utilising UK LSBS data, this research shows that radical product innovation increases managers' growth expectations, which, in turn, raises the likelihood of subsequent exporting. In doing so, this study moves beyond the research that focused solely on radical innovation's direct effects on exporting or productivity-based self-selection mechanisms (Añón Higón and Driffield 2011; Cassiman and Golovko 2011; Love and Roper 2015), and positions growth expectations as the key to understanding why certain innovative SMEs export while others do not.

Second, the study deepens and extends TGF by operationalising its core constructs in the SME internationalisation context and showing how they interact in a specific growth path. While the prior research emphasised that innovation enhances international competitiveness and export performance (Martínez-Román et al. 2019; Saridakis et al. 2019), the majority of studies concentrated on observable activities such as R&D investments, productivity outcomes or immediate financial indicators (Añón Higón and Driffield 2011; Love and Roper 2015; Saridakis et al. 2019). The role of forward-looking managerial expectations has remained largely implicit. By demonstrating that radical product innovation expands the perceived productive opportunity set, that this expansion is reflected by higher growth expectations and that these expectations guide the choice of exporting as a growth path, this study translates Penrose's conceptual logic into an empirically-tested SME internationalisation model. The findings show that, for SMEs, export behaviour is not only a response to realised performance, but also a proactive strategic choice that is driven by expectations of innovation-based growth, which aligns directly with TGF's emphasis on expectations and opportunity perception as the drivers of firm expansion (Doern 2009; Penrose 1959).

Third, the study introduces customer portfolio breadth as a theoretically-grounded boundary condition that shapes the innovation/expectations/export chain, thereby linking TGF's knowledge-accumulation logic to the innovation-for-exporting perspective. Prior work that was grounded on TGF tended to emphasise internal resource recombination and generic learning processes as the drivers of growth (Kor et al. 2016; Lockett et al. 2011; Penrose 1959), whereas SME internationalisation studies have tended to treat customer relationships as background conditions rather than explicit strategic structures (Bianchi et al. 2017; Knight and Cavusgil 2004). By theorising and confirming customer portfolio breadth's U-shaped moderating effect on the relationship between radical product innovation and growth expectations, this study shows that the customer base's structure critically affects how innovation-generated opportunities are interpreted. Growth expectations are highest when SMEs adopt either a highly focused or a highly diversified customer portfolio and weakest at intermediate levels of breadth. This result extends the existing work on customer networks, portfolio strategies and SME growth (Denoo et al. 2022; Falahat et al. 2020) by demonstrating that moderate diversification can weaken the signals that managers receive about the growth potential arising from radical innovations, because it erodes both the depth of specialisation and the breadth required for effective cross-sector knowledge recombination (Du 2021; Weinstein 2013).

These insights also refine TGF's conceptualisation of productive opportunities by showing that the external market engagement structures alter how managers perceive and evaluate innovation-driven growth possibilities. While TGF typically focuses on internal resource configurations, our findings indicate that the configuration of customer relationships, as captured by



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customer portfolio breadth, determines whether knowledge accumulation yields clear or ambiguous signals about opportunities (Autio et al. 2011; Balau et al. 2020; Dibb and Simkin 1991). At low levels of breadth, repeated interactions within a single segment produce concentrated information that strengthens the managers' confidence in specialised innovations. At high levels of breadth, the exposure to heterogeneous customers generates diverse knowledge that broadens the perceived growth trajectories and suggests multiple routes for scaling innovations. At intermediate levels, however, firms face fragmented, sometimes conflicting signals, which dilute the growth expectations. By highlighting the customer portfolio strategy as a critical external determinant of how productive opportunities are identified and acted upon, the study reconceptualises Penrosian growth as a function of both internal resource orchestration and the external configuration of market engagement (Cavusgil and Knight 2015; Kor et al. 2016; Penrose 1959).

Finally, the findings point to boundary conditions for these mechanisms that arise from the institutional context and offer guidance on these results' applicability beyond UK SMEs. The analysis is situated in the UK, where the relatively developed financial markets, liberal trade policies and institutional support mechanisms facilitate SME internationalisation (Dai and Cheng 2018; Frank et al. 2016). In economies with stronger trade barriers, weaker financial systems or more intensive bureaucratic constraints, this pattern of relationships may be moderated by the higher costs and risks associated with export behaviour, which might weaken the link between growth expectations and actual export behaviour. Customer portfolio breadth may also play a different role in relationship-oriented markets, where deep ties with a narrow set of customers generate stronger growth signals compared to broad diversification (Hashmi et al. 2022; Nguyen et al. 2008). Moreover, export promotion schemes and SME support programmes can change the degree to which expectations translate into action by lowering the perceived risks or, if these are absent, by leaving aspirations unrealised (Haddoud et al. 2023; Raymond and St-Pierre 2013). These contextual considerations suggest that, while the underlying TGF-based mechanism and boundary condition may be relevant for SMEs in other countries, future cross-country research should examine how the institutional quality, financial accessibility and trade openness shape the strength and form of the innovation/expectations/export mechanism and its moderation by customer portfolio breadth.

## 6.2 | Managerial Implications

The findings provide actionable guidance for SME managers who are seeking to leverage radical product innovation for growth and international expansion in the UK and similar institutional settings. Radical product innovation strengthens firms' competitive positioning. However, its effect on export behaviour depends on how the managers frame their growth expectations. Managers can cultivate a growth-driven mindset by setting clear, long-term objectives, embedding growth aspirations into business planning and aligning the innovation efforts with the existing international market opportunities. Structured goal-setting, leadership development and engagement with external advisors can reinforce this orientation (Castaño et al. 2016; Wiklund et al. 2003). Training and mentorship schemes, such as those offered by incubators and accelerators (Bone et al. 2019), also help SMEs to strengthen their growth orientation and prepare for internationalisation (Eldering et al. 2023).

Customer portfolio breadth emerges as a pivotal factor. The U-shaped moderating effect demonstrates that SMEs achieve the strongest growth expectations when adopting either a highly-focused or a highly-diversified customer portfolio. A focused customer portfolio fosters deep knowledge of a specific customer segment, which paves the way for customised solutions and stronger differentiation. A diversified customer portfolio exposes firms to heterogeneous knowledge sources, thereby enabling the recombination of insights across different sectors and broader opportunities for export expansion. In contrast, a moderately-diversified portfolio reduces the benefits of both strategies and also weakens innovation-driven growth expectations. Managers should therefore avoid the 'middle ground' and instead commit to one of the two strategic paths. When applying these insights outside the UK, managers should consider the local institutional conditions, such as the availability of export support, the reliability of trade finance and the nature of their customer relationships, which may either reinforce or constrain the focused and diversified portfolio strategies' relative effectiveness. This decision should be informed by a careful assessment of the market positioning, available resources and innovation capabilities. Practical tools, such as customer relationship management systems, segmentation analytics and value-based pricing, can support this process (Clauss 2017; Schweitzer et al. 2018).

## 6.3 | Policy Implications

The findings also highlight policy's role in enabling SMEs to translate radical product innovation into export growth. First, export promotion agencies should design support programmes that recognise both focused and diversified customer portfolio breadth's distinct advantages. For focused customer portfolios, these policies can provide targeted intelligence on niche markets, subsidised participation in specialised trade fairs, and tailored advisory services. For diversified customer portfolios, governments can facilitate access to international networks, cross-sector partnerships, and digital platforms that broaden firms' exposure to global opportunities.

Second, financial incentives such as innovation vouchers, tax credits or export credit guarantees can reduce the risks associated with scaling radical innovations abroad. These tools are particularly valuable for SMEs that face resource constraints yet seek to internationalise based on innovation-led differentiation. Third, capability-building policies are essential. Training courses related to customer analytics, digital marketing and international strategy can strengthen SME managers' ability to choose and sustain an appropriate portfolio approach. Similarly, public/private partnerships that develop shared market intelligence platforms can lower the entry costs and increase SMEs' awareness of the foreign demand situation. While these recommendations are grounded in the UK context, the underlying policy logic is transferable to other countries, provided that the instruments are adapted appropriately to suit the local institutional reality, such as the strength of the export credit systems, the sophistication of



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the financial markets and the degree of trade openness. By aligning the policy instruments with the mechanisms that were identified in this study (growth expectations and customer portfolio breadth), governments and support agencies may improve the effectiveness of SMEs' innovation and export strategies, thereby contributing to broader economic competitiveness.

### 6.4 | Limitations and Future Research Opportunities

This study acknowledges several limitations. First, we acknowledge that the use of binary indicators for both radical product innovation and export behaviour reduces the granularity of the analysis. The innovation measure fails to capture any variation in intensity, scope or speed, and therefore is unable to distinguish between incremental and substantial innovation efforts. Similarly, the export variable focuses on whether firms enter export markets, without capturing differences in their export intensity, geographic scope, or market diversification. These limitations are a common feature of studies that rely on large-scale, secondary datasets, where detailed information on innovation and export activity is often unavailable (Golovko and Valentini 2011; Liu, Liu, and Ko 2022). In this study, the binary specification is consistent with the theoretical focus on export entry rather than export performance or expansion. As such, it allows a clearer identification of the determinants of the initial internationalisation decisions, albeit at the cost of reduced detail. Future research might extend the analysis by incorporating more granular measures, such as innovation expenditure, patent-based indicators or export intensity and geographic diversification, to capture both the scale and complexity of firms' innovation and internationalisation activities.

Second, our exclusive focus on UK SMEs limits the generalisability of our findings. The UK's strong financial markets, open trade policies, and institutional support facilitate SME internationalisation (Dai and Cheng 2018; Frank et al. 2016). In economies with trade barriers or weaker financial systems, it may prove more challenging to translate firms' growth expectations into actual export behaviour. Customer portfolio breadth may function differently where firms rely on long-term relationships rather than diversification. Future research might compare different countries and industries to explore how the institutional environments and trade policies shape the innovation/export behaviour link.

Third, our reliance on secondary data constrains the analytical depth of our study. Self-reported growth expectations, as a mediating variable, potentially introduce response biases into our findings. In addition, the analysis is based on the 2015–2017 LSBS panel, which, despite the 3-year recall period for innovation and additional robustness checks using later export outcomes, still captures innovation/export dynamics over a relatively limited time horizon. All of these aforementioned constraints might be addressed in the future by applying primary research that is purposefully designed to counteract the limitations of the current study.

Fourth, whilst this study applies TGF to explain how radical product innovation influences SME growth expectations and export behaviour, it fails to account fully for the resource constraints that may limit SMEs' ability to act on their growth expectations. Future research might explore how financial constraints, managerial capabilities, and access to international networks shape the innovation/exporting relationship. An investigation of firm size, industry conditions, and institutional support could provide a more nuanced understanding.

Finally, whilst this study explores export behaviour as a preferred growth path, future research might examine alternative strategic avenues. Pathways such as open innovation (Brunswicker and Vanhaverbeke 2015), strategic collaboration (Love and Roper 2015), and targeted marketing initiatives (Boso et al. 2018) may serve as viable mechanisms for translating radical innovation into growth. Future research might investigate whether firms choose these strategies over, or alongside, export behaviour.

#### Funding

We would like to acknowledge the support by UK Research and Innovation (UKRI) and UK Economic and Social Research Council (ESRC) for project ES/W010259/1.

#### Conflicts of Interest

The authors declare no conflicts of interest.

#### Data Availability Statement

The data is available to registered users from the UK Data Archive (https://ukdataservice.ac.uk/).

#### Endnotes

[1] This research focuses on innovation as the 'outputs' (or 'marketing offers') (Frank et al. 2016) that firms develop successfully that are unique, distinctive and new to the market in the form of products and/or services. For simplicity, these innovation outputs are referred to here as 'radical product innovation'.

[2] The LSBS survey failed to record negative growth expectations. Additional analysis using a dummy variable derived from the screening question confirms that the main findings remained unchanged (Appendix 3).

[3] This assessment differs from Denoo et al. (2022) due to the use of a different dataset, but the essence of their findings on the degree of customer diversity that firms target in their marketing strategies has been captured.

[4] Our weighting scheme overrepresents businesses with 5–249 employees to ensure robust analysis. Appendix 2 provides unweighted statistics. Multivariate regressions exclude weights since they are based on employee size and sector, which are control variables.

[5] For the same reason argued when defining the primary DV in Section 3, only SMEs with a non-decreasing export/sales proportion are included. This new specification results in a changed sample size of 6314.

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**Appendix 1: Variable Definition and Measurement**

| Variables | Measurements/Definition |
|---|---|
| Export behaviour | Firm selling goods/services or licence products outside the UK (0, 1) |
| Radical product innovation | Introducing new or significantly improved goods and services new to the market in the last 3 years (0, 1) |
| Growth expectations | Expected growth in sales in the next 3 years in decimal numbers |
| Customer portfolio breadth | Number of customer categories (private sector businesses, individual consumers, charities or third sector organisations, the public sector) of a firm |
| Employee number | Number of employees including owner |
| Firm age | Number of years since firm establishment |
| Production and construction | Broad sector dummy based on SIC 2007 for (i) primary (ABDE), (ii) manufacturing and (iii) construction (F) |
| Transport and retail | Broad sector dummy based on SIC 2007 for (i) wholesale/retail (G), (ii) transport/storage (H) and (iii) accommodation/food services (I) |
| Business services | Broad sector dummy based on SIC 2007 for (i) information/communication (J), (ii) financial/real estate (KL), (iii) professional/scientific/technical activities (M) and (iv) administrative/support service (N) |
| Other services | Broad sector dummy based on SIC 2007 for (i) education (P), (ii) health/social work (Q), (iii) arts/entertainment/recreation and (iv) other services (S) |
| Ltd liability | Limited liability company (0, 1) |
| Women-led | Women-led business (0, 1) |
| Minority-led | Ethnic minority-led business (0, 1) |
| Business plan | Firm having formal written business plan (0, 1) |

**Appendix 2: Unweighted Descriptive Statistics**

| Variables | Mean | SD | Median | Min | Max | Mean RPI = 1 | Mean RPI = 0 |
|---|---|---|---|---|---|---|---|
| Export behaviour | 0.050 | 0.217 | 0 | 0 | 1 | 0.093 | 0.044 |
| Radical product innovation (RPI) | 0.109 | 0.312 | 0 | 0 | 1 | | |
| Growth expectations | 0.147 | 0.270 | 0.05 | 0 | 1.12 | 21.869 | 21.409 |
| Customer portfolio breadth | 2.108 | 1.086 | 2 | 0 | 4 | 0.281 | 0.160 |
| Employee number | 0.375 | 0.811 | 6 | 1 | 247 | 2.412 | 2.271 |
| Firm age | 2.863 | 0.747 | 26.5 | 1.5 | 71.5 | 22.800 | 25.713 |
| Production and Construction | 0.165 | 0.371 | 0 | 0 | 1 | 0.158 | 0.209 |
| Transport and retail | 0.315 | 0.465 | 0 | 0 | 1 | 0.174 | 0.249 |
| Business services | 0.278 | 0.448 | 0 | 0 | 1 | 0.401 | 0.294 |
| Other services | 0.414 | 0.493 | 0 | 0 | 1 | 0.267 | 0.248 |
| Ltd liability | 0.224 | 0.417 | 1 | 0 | 1 | 0.746 | 0.657 |
| Women-led | 0.046 | 0.210 | 0 | 0 | 1 | 0.204 | 0.198 |
| Minority-led | 0.244 | 0.429 | 0 | 0 | 1 | 0.052 | 0.046 |
| Business plan | 0.050 | 0.217 | 0 | 0 | 1 | 0.552 | 0.445 |

*Note:* Number of observations = 5203 except for Export (2986) due to pairwise deletion.



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**Appendix 3: Regressions Using Alternative Growth Expectation Measure**

| | Model I | | Model II | |
|---|---|---|---|---|
| | **Prob (growth expectations)** | **Prob (export)** | **Prob (growth expectations)** | **Prob (export)** |
| *Predictors* | | | | |
| Radical product innovation (RPI) | 0.232 | 0.345 | 1.175 | 0.345 |
| | (0.062) | (0.107) | (0.299) | (0.107) |
| | [0.000] | [0.001] | [0.000] | [0.001] |
| Growth expectations | | 0.155 | | 0.155 |
| | | (0.091) | | (0.091) |
| | | [0.090] | | [0.090] |
| Customer portfolio breadth (CPB) | | | 0.169 | |
| | | | (0.082) | |
| | | | [0.039] | |
| Radical product innovation × CPB | | | −0.841 | |
| | | | (0.280) | |
| | | | [0.003] | |
| $CPB^2$ | | | −0.016 | |
| | | | (0.017) | |
| | | | [0.352] | |
| Radical product innovation × $CPB^2$ | | | 0.151 | |
| | | | (0.057) | |
| | | | [0.008] | |
| Control variables | Yes | Yes | Yes | Yes |
| Constant | 0.252 | −1.796 | 0.289 | −1.858 |
| | (0.095) | (0.212) | (0.023) | (0.213) |
| | [0.008] | [0.000] | [0.000] | [0.000] |
| *N* | 5203 | | 5203 | |
| Log likelihood | −3708.34 | | −3690.13 | |

*Note:* Coefficients are reported with robust standard errors in parentheses and *p*-values in brackets. Growth expectations (0, 1) = 1, if business expected increased sales in the future, and 0 otherwise. Control variables include Ln(Employee number), Ln(Firm age), Industry dummies, Limited liability company, Women-led business, Ethnic minority-led business, and firm having a formal written business plan. Full regressin results are reported in Appendix 4.



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**Appendix 4: Full Regression Table for Table 2**

| | Model I | | Model II | |
|---|---|---|---|---|
| | **Growth expectations** | **Prob (export)** | **Growth expectations** | **Prob (export)** |
| *Predictors* | | | | |
| Radical product innovation | 0.097 | 0.308 | 0.274 | 0.308 |
| | (0.011) | (0.110) | (0.051) | (0.110) |
| | [0.000] | [0.005] | [0.000] | [0.005] |
| Growth expectations | | 0.359 | | 0.359 |
| | | (0.139) | | (0.139) |
| | | [0.010] | | [0.010] |
| Customer portfolio breadth (CPB) | | | 0.020 | |
| | | | (0.015) | |
| | | | [0.194] | |
| Radical product innovation × CPB | | | −0.143 | |
| | | | (0.048) | |
| | | | [0.003] | |
| $CPB^2$ | | | −0.003 | |
| | | | (0.003) | |
| | | | [0.306] | |
| Radical product innovation × $CPB^2$ | | | 0.024 | |
| | | | (0.010) | |
| | | | [0.016] | |
| Ln(Employee number) | 0.003 | 0.036 | 0.003 | 0.036 |
| | (0.003) | (0.030) | (0.003) | (0.030) |
| | [0.295] | [0.227] | [0.325] | [0.227] |
| Ln(Firm age) | −0.063 | −0.036 | −0.063 | −0.036 |
| | (0.005) | (0.055) | (0.005) | (0.055) |
| | [0.000] | [0.513] | [0.000] | [0.513] |
| Ltd liability | 0.046 | 0.090 | 0.045 | 0.090 |
| | (0.008) | (0.097) | (0.008) | (0.097) |
| | [0.000] | [0.350] | [0.000] | [0.350] |
| Women-led | −0.020 | −0.024 | −0.019 | −0.024 |
| | (0.009) | (0.106) | (0.009) | (0.106) |
| | [0.023] | [0.817] | [0.031] | [0.817] |
| Minority-led | 0.045 | 0.007 | 0.046 | 0.007 |
| | (0.016) | (0.198) | (0.016) | (0.198) |
| | [0.006] | [0.972] | [0.006] | [0.972] |
| Business plan | 0.053 | −0.093 | 0.053 | −0.093 |
| | (0.008) | (0.089) | (0.008) | (0.089) |
| | [0.000] | [0.300] | [0.000] | [0.300] |
| Transport and retail | −0.032 | 0.058 | −0.033 | 0.058 |
| | (0.010) | (0.129) | (0.010) | (0.129) |
| | [0.002] | [0.655] | [0.002] | [0.655] |



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| | Model I | | Model II | |
|---|---|---|---|---|
| | **Growth expectations** | **Prob (export)** | **Growth expectations** | **Prob (export)** |
| Business services | 0.013 | 0.288 | 0.012 | 0.288 |
| | (0.010) | (0.116) | (0.010) | (0.116) |
| | [0.181] | [0.013] | [0.211] | [0.013] |
| Other services | −0.051 | −0.205 | −0.051 | −0.205 |
| | (0.011) | (0.143) | (0.011) | (0.143) |
| | [0.000] | [0.151] | [0.000] | [0.151] |
| East of England | 0.007 | 0.331 | 0.005 | 0.331 |
| | (0.016) | (0.196) | (0.016) | (0.196) |
| | [0.671] | [0.091] | [0.757] | [0.091] |
| London | 0.046 | 0.420 | 0.046 | 0.420 |
| | (0.016) | (0.196) | (0.016) | (0.196) |
| | [0.005] | [0.032] | [0.005] | [0.032] |
| North East | −0.001 | 0.001 | −0.002 | 0.001 |
| | (0.022) | (0.289) | (0.022) | (0.289) |
| | [0.981] | [0.998] | [0.923] | [0.998] |
| North West | −0.016 | −0.005 | −0.017 | −0.005 |
| | (0.017) | (0.224) | (0.017) | (0.224) |
| | [0.329] | [0.980] | [0.311] | [0.980] |
| South East | −0.003 | 0.106 | −0.003 | 0.106 |
| | (0.015) | (0.194) | (0.015) | (0.194) |
| | [0.853] | [0.585] | [0.824] | [0.585] |
| South West | 0.000 | 0.142 | −0.001 | 0.142 |
| | (0.015) | (0.199) | (0.015) | (0.199) |
| | [0.995] | [0.474] | [0.957] | [0.474] |
| West Midlands | 0.005 | 0.104 | 0.004 | 0.104 |
| | (0.018) | (0.222) | (0.017) | (0.222) |
| | [0.773] | [0.637] | [0.812] | [0.637] |
| Yorkshire and the Humber | −0.007 | 0.382 | −0.008 | 0.382 |
| | (0.018) | (0.211) | (0.018) | (0.211) |
| | [0.702] | [0.071] | [0.668] | [0.071] |
| Scotland | −0.022 | 0.134 | −0.023 | 0.134 |
| | (0.018) | (0.220) | (0.018) | (0.220) |
| | [0.202] | [0.542] | [0.186] | [0.542] |
| Wales | −0.006 | −0.464 | −0.006 | −0.464 |
| | (0.022) | (0.421) | (0.022) | (0.421) |
| | [0.794] | [0.271] | [0.771] | [0.271] |
| Northern Ireland | 0.021 | 0.222 | 0.021 | 0.222 |
| | (0.024) | (0.290) | (0.024) | (0.290) |
| | [0.385] | [0.443] | [0.396] | [0.443] |
| Constant | 0.311 | −2.012 | 0.287 | −2.012 |
| | (0.021) | (0.267) | (0.026) | (0.267) |
| | [0.000] | [0.000] | [0.000] | [0.000] |



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| | Model I | | Model II | |
|---|---|---|---|---|
| | Growth expectations | Prob (export) | Growth expectations | Prob (export) |
| *N* | 5203 | | 5203 | |
| Log likelihood | −636.01 | | −628.53 | |

*Note:* Coefficients are reported with robust standard errors in parentheses and *p*-values in brackets. Base category for sector = Production and Construction.

**Appendix 5: Instrumental Variable (GMM 2-Stage) Regression for Growth Expectation**

| | Growth expectations$_t$ |
|---|---|
| *Predictors* | |
| Radical product innovation$_t$ | 0.453 |
| | (0.061) |
| | [0.000] |
| *Instruments* | |
| R&D Tax Credit$_t$ | 0.301 |
| | (0.025) |
| | [0.000] |
| Deprived Area | 0.009 |
| | (0.012) |
| | [0.426] |
| Control variables | Yes |
| Constant | 0.287 |
| | (0.022) |
| | [0.000] |
| *N* | 5203 |
| *F* Statistic | 57.16 |
| | [0.000] |
| $R^2$ | 0.340 |
| *IV test statistics* | |
| Overidentification (Hansen *J*-statistic) | 0.158 |
| | [0.691] |
| Underidentification (Kleibergen–Paap LM-statistic) | 115.520 |
| | [0.000] |
| Weak identification (Cragg–Donald *F* statistic) | 173.836 |
| Weak identification (Kleibergen–Paap *F* statistic) | 73.628 |
| Stock-Yogo weak ID test 10% critical value | 19.93 |
| Endogeneity test ($\chi^2(1)$) | 28.907 |
| | [0.000] |

*Note:* Coefficients are reported with robust standard errors in parentheses and *p*-values in brackets.



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**Appendix 6: Control-Function Model Regression Results**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | **Growth expectations** | **Prob (export)** | **Growth expectations** | **Prob (export)** |
| *Predictors* | | | | |
| Radical product innovation | 0.022 | 0.287 | 0.145 | 0.288 |
| | (0.011) | (0.113) | (0.055) | (0.113) |
| | [0.056] | [0.011] | [0.008] | [0.011] |
| Growth expectations | | 0.419 | | 0.419 |
| | | (0.139) | | (0.139) |
| | | [0.003] | | [0.003] |
| Customer portfolio breadth (CPB) | | | 0.009 | |
| | | | (0.015) | |
| | | | [0.522] | |
| Radical product innovation × CPB | | | −0.112 | |
| | | | (0.052) | |
| | | | [0.030] | |
| $CPB^2$ | | | −0.002 | |
| | | | (0.003) | |
| | | | [0.624] | |
| Radical product innovation × $CPB^2$ | | | 0.021 | |
| | | | (0.011) | |
| | | | [0.050] | |
| Controls | Yes | Yes | Yes | Yes |
| *N* | 4986 | | 4986 | |
| Log likelihood | −671.90 | | −668.77 | |

*Note:* Coefficients are reported with robust standard errors in parentheses and *p*-values in brackets.



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## Appendix 7: Robustness Test Results

| | Model I | | Model II | | Model III | | Model IV | | Model V | | Model VI | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Growth expectations | Prob (export) | Growth expectations | Prob (export) | Growth expectations | ΔExport/ Sales | Growth expectations | ΔExport/ Sales | Growth expectations | Prob (export expectations) | Growth expectations | Prob (export expectations) | Prob (export) |
| *Predictors* | | | | | | | | | | | | | |
| Radical product innovation | 0.097 | 0.318 | 0.263 | 0.318 | 0.111 | 2.113 | 0.179 | 2.113 | 0.098 | 0.415 | 0.090 | 0.446 | −0.097 |
| | (0.011) | (0.109) | (0.051) | (0.109) | (0.009) | (0.418) | (0.042) | (0.418) | (0.011) | (0.129) | (0.015) | (0.132) | (0.214) |
| | [0.000] | [0.004] | [0.000] | [0.004] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.001] | [0.000] | [0.001] | [0.652] |
| Growth expectations | | 0.404 | | 0.404 | | 1.960 | | 1.960 | | 0.967 | | 1.024 | 0.112 |
| | | (0.138) | | (0.138) | | (0.549) | | (0.549) | | (0.145) | | (0.148) | (0.255) |
| | | [0.004] | | [0.004] | | [0.000] | | [0.000] | | [0.000] | | [0.000] | [0.660] |
| Export expectations | | | | | | | | | | | | | 0.742 |
| | | | | | | | | | | | | | (0.267) |
| | | | | | | | | | | | | | [0.006] |
| Customer portfolio breadth (CPB) | | | 0.016 | | | | 0.012 | | | | | | |
| | | | (0.015) | | | | (0.015) | | | | | | |
| | | | [0.308] | | | | [0.406] | | | | | | |
| Radical product innovation × CPB | | | −0.135 | | | | −0.041 | | | | | | |
| | | | (0.048) | | | | (0.040) | | | | | | |
| | | | [0.005] | | | | [0.305] | | | | | | |
| $CPB^2$ | | | −0.002 | | | | −0.002 | | | | | | |
| | | | (0.003) | | | | (0.003) | | | | | | |
| | | | [0.431] | | | | [0.569] | | | | | | |
| Radical product innovation × $CPB^2$ | | | 0.022 | | | | 0.004 | | | | | | |
| | | | (0.010) | | | | (0.008) | | | | | | |
| | | | [0.023] | | | | [0.616] | | | | | | |
| Productivity | −0.006 | 0.088 | −0.006 | 0.088 | | | | | | | | | |
| | (0.003) | (0.033) | (0.003) | (0.033) | | | | | | | | | |
| | [0.011] | [0.008] | [0.021] | [0.008] | | | | | | | | | |



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| | Model I | | Model II | | Model III | | Model IV | | Model V | | Model VI | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Growth expectations** | **Prob (export)** | **Growth expectations** | **Prob (export)** | **Growth expectations** | **ΔExport/ Sales** | **Growth expectations** | **ΔExport/ Sales** | **Growth expectations** | **Prob (export expectations)** | **Growth expectations** | **Prob (export expectations)** | **Prob (export)** |
| Perception on competition | 0.023 | 0.013 | 0.022 | 0.013 | | | | | | | | | |
| | (0.007) | (0.082) | (0.007) | (0.082) | | | | | | | | | |
| | [0.001] | [0.873] | [0.001] | [0.873] | | | | | | | | | |
| Regional GDP growth (%) | 0.006 | 0.056 | 0.006 | 0.056 | | | | | | | | | |
| | (0.004) | (0.049) | (0.004) | (0.049) | | | | | | | | | |
| | [0.120] | [0.250] | [0.124] | [0.250] | | | | | | | | | |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 0.350 | −3.017 | 0.325 | −3.017 | 0.332 | 0.110 | 0.316 | 0.110 | 0.311 | −1.942 | 0.300 | −1.901 | −2.206 |
| | (0.034) | (0.452) | (0.038) | (0.452) | (0.017) | (0.756) | (0.022) | (0.756) | (0.018) | (0.255) | (0.024) | (0.257) | (0.374) |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.884] | [0.000] | [0.884] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| *N* | 5203 | | 5203 | | 6314 | | 6314 | | 5203 | | 2838 | | |
| Log likelihood | −622.21 | | −615.51 | | −12,236.5 | | −12,232.8 | | −386.17 | | −486.78 | | |

*Note:* Coefficients are reported with robust standard errors in parentheses and *p*-values in brackets.



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**Appendix 8: The Effect of Customer Type on Growth Expectation**

| | Growth expectations | Prob (export) |
|---|---|---|
| *Predictors* | | |
| Radical product innovation | 0.098 | 0.312 |
| | (0.011) | (0.109) |
| | [0.000] | [0.004] |
| Growth expectations | | 0.383 |
| | | (0.137) |
| | | [0.005] |
| Private sector customer | 0.012 | |
| | (0.009) | |
| | [0.156] | |
| Radical product innovation × Private sector customer | 0.030 | |
| | (0.026) | |
| | [0.241] | |
| Individual customer | −0.000 | |
| | (0.009) | |
| | [0.986] | |
| Radical product innovation × Individual customer | −0.031 | |
| | (0.024) | |
| | [0.211] | |
| Charity customer | 0.013 | 0.035 |
| | (0.008) | (0.030) |
| | [0.125] | [0.234] |
| Radical product innovation × Charity customer | −0.064 | −0.036 |
| | (0.025) | (0.055) |
| | [0.010] | [0.506] |
| Public sector customer | −0.010 | 0.068 |
| | (0.008) | (0.127) |
| | [0.213] | [0.592] |
| Radical product innovation × Public sector customer | −0.024 | 0.290 |
| | (0.024) | (0.114) |
| | [0.317] | [0.011] |
| Control variables | Yes | Yes |
| Constant | 0.301 | −1.858 |
| | (0.020) | (0.213) |
| | [0.000] | [0.000] |
| *N* | 5203 | |
| Log likelihood | −625.19 | |

*Note:* Coefficients are reported with robust standard errors in parentheses and *p*-values in brackets. Control variables include Ln(Employee number), Ln(Firm age), Industry dummies, Limited liability company, Women-led business, Ethnic minority-led business, and firm having a formal written business plan.



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