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Characteristics of SME Service Exporters: Business Support and Barriers

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Table of Contents

About the Enterprise Research Centre 2
Disclaimer 2
Acknowledgements 2
Suggested Citation 2
Table of Contents 1
1. Executive Summary 3
2. Introduction 4
2.1 Background and Context 4
2.2 Research Questions 5
2.3 Structure of the Research Paper 5
3. Literature Review 6
3.1 Export service firm characteristics 6
3.2 Export support and promotion 7
3.3 Export Barriers 8
3.4 Summary and Gaps 8
4. Methodology 10
4.1 Research Design 10
4.2 Data Sources 11
4.3 Analytical Methods 12
4.3.1. Analytical Strategy 12
4.3.2. Descriptive analysis 13
4.3.3. Dependent Variables and selection of model 14
4.3.4 Linear mixed-effects models 15
4.3.5 Logistic and mixed-effects logistic models 15
4.3.6 Lagged models 16
4.3.7 Interaction models 16
4.3.8 Control variables 16
4.3.9 Hypothesis-specific model sequence 17
4.3.10 Software and statistical inference 17
4.4. Causal map 17
4.5 Limitations 18
5. Findings 20
5.1 Characterising Service-Exporting SMEs 20
5.1.1 Export Participation and Firm Size 20
5.1.2 Sectoral Profile 21
5.1.3 Ownership and Leadership 23
5.1.4 International Market Access 23
5.2 The role of business advice and finance in service export performance and intensity 25
5.2.1 Export advice and service export intensity 25
5.2.2 External Finance and Service Export Intensity 26
5.3 Obstacles for service exporters 27
5.3.1 Business Obstacles Among Service and Product Exporters 27

5.3.2 Finance Use and Business Obstacles Among Service Exporters 29
5.3.3 Advice Receipt and Business Obstacles Among Service Exporters 30
5.4 Obstacles for service exporters 31
6. Conclusions and Recommendations 34
6.1 Summary of Key Findings 37
7. References 38
Appendices 43
Appendix A: Model variables 43
Appendix B: Supplementary advice models predicting service export intensity among service-only exporters 45
Appendix C: Supplementary grouped-finance models among service-only exporters 45
Appendix D: Supplementary grouped-finance models among service-only exporters 46
Appendix E: Supplementary and robustness analyses of finance use and reported business obstacles 46
Appendix F: Supplementary and robustness analyses of advice receipt and reported business obstacles 47

1. Executive Summary

The limited evidence base concerning the characteristics of service firms beyond firm size points to a significant knowledge gap regarding the nature of service exporters and the types of assistance most effective in supporting them. Although current studies suggest that export promotion mechanisms can positively affect export intensity, there is a lack of research on whether these effects continue beyond the intervention. Furthermore, there is no clarity on whether support mechanisms, such as export advice and finance help service SMEs exporters to reduce obstacles. Therefore, this research has three main objectives:

1. Understand **who** the exporters of services are by characteristics including gender, ethnicity, location, business size, experience, and ownership type.
2. Determine **how** business support (e.g., business advice and external finance) influences the intention and behaviour of SMEs to expand abroad.
3. Define **what** types of obstacles affect the export intensity of exporters of services and the role of export promotion services in overcoming these barriers to trade.

To tackle these objectives, this study uses the Longitudinal Small Business Survey to examine the characteristics, support experiences, business obstacles and their relationship with export intensity of UK SMEs that export services exclusively. The analysis first develops a detailed profile of service-only exporters, including their size, age, sector, ownership characteristics, export activity, finance use, support engagement and reported obstacles. It then investigates whether business advice, support and external finance are associated with service export intensity using mixed-effects regression models and lagged specifications. The study also explores the obstacles faced by service-only exporters, compares these with those experienced by other exporter groups, and assesses how business advice, finance, and reported obstacles relate to export intensity. Finally, the findings are integrated through an exploratory systems-thinking framework that maps the relationships among service exporting, business support, access to finance, business obstacles, and export intensity, providing a holistic interpretation of the factors shaping the performance of service-exporting SMEs.

Key Findings at a Glance

- Finding one: Service-exporting SMEs form a distinct exporter group, being generally smaller, knowledge-intensive firms concentrated in markets such as the EU, US and Canada.
- Finding two: Between 2015 and 2024, overall SME exporting remained stable, but service exporting declined while product exporting increased slightly.
- Finding three: Neither advice nor external finance was linked to higher service export intensity, suggesting these supports may strengthen capabilities rather than immediately increase export revenues.
- Finding four: The findings support tailored, integrated policies that combine financial, advisory, regulatory and digital support to address the specific needs of service-exporting SMEs.
- Finding five: The causal map suggests that finance and advice are most effective when they contribute to firms' capability development, but their benefits may be delayed and may not immediately translate into higher export intensity or fewer reported obstacles.

2. Introduction

2.1 Background and Context

The total value of UK exports reached £925.5 billion in 2025, a 3.1% increase compared with 2024. This growth was largely driven by a 7.8% rise in services exports, which offset a 3.0% decline in goods exports (ONS, UK Trade, 2025). The strong performance of services reflects their pivotal role in international trade and investment, accounting for over 60% of global GDP (World Bank, 2024). This aligns with the structure of the UK economy, which is primarily driven by the services sector, encompassing retail, hospitality, finance, and public services such as health and education. By contrast, non-service sectors - including manufacturing, construction, agriculture, and utilities - together contribute roughly one-fifth of total economic output (House of Commons Library, 2024).

Despite this positive trend for services exports in the UK, recent studies suggest that key sectors such as financial services, information technology, and transport face significant contraction risk due to Brexit (e.g., Ahmad et al., 2023; Du & Shepotylo, 2025; Kren & Lawless, 2024). Exporting services also presents considerable challenges for policymakers because of their complex and diverse nature. This makes designing effective, well-targeted policy interventions more difficult (Brandl et al., 2025). Moreover, services are more likely to be intangible, rely on real-time interactions, and often require the physical presence of both provider and customer, increasing their vulnerability to policy shifts, regulatory constraints, and broader uncertainty in the trading environment (Du et al., 2025).

These complexities highlight the need to identify the distinctive characteristics of international services exporters and to better understand the mechanisms of support that drive their internationalisation (Brandl et al., 2025). In a recent ERC state of the art review (SOTA), Golubova (2024) highlights the limited understanding of the factors shaping firms' export decisions across different contexts and stages of development (e.g., firm size, sector, experience, and region). This lack of understanding is particularly evident when adopting an inclusive growth perspective. Existing evidence suggests that women-led businesses tend to be smaller and are primarily concentrated in the services sector, which partly explains the observed gender differences in exporting (Arshed et al., 2025; Treanor et al., 2025). However, research examining service exports including firm characteristics such as gender or ethnicity, remains limited. This is because existing research rarely targets services specifically (e.g., Arun et al., 2024; Davies & Mazhikeyev, 2021).

Evidence suggests that export promotion mechanisms can positively affect both export participation and export value with effects continuing beyond the intervention. A Danish study found the likelihood of a firm being an exporter increased by 3.9% in the treatment year compared with control firms, rising to around 5.9% one and two years afterward (Munch and Schaur 2018). Freixanet (2012) found that success of firms receiving support in the early stages of exporting exhibit stronger positive correlations with a wider range of impact measures. This research concluded that SMEs require early additional support to develop their exports, including training and information to enhance competitiveness, as well as assistance in identifying contacts and market opportunities. Furthermore, networking, knowledge, resources, and institutional support are central to SME internationalisation (Sannegadu et al., 2023). Regarding network support, Ricci et al. (2012) demonstrated that firms with better network connections enjoy a 15% higher probability of exporting.

Given limited research examining the characteristics of service firms beyond firm size, there is a clear need to better understand both the distinctive features of service exporters and the types of support they require (DIT, 2021). Furthermore, recent changing global geopolitical conditions are challenging established existing practices of UK exporting. For instance, the British Chambers of Commerce report that uncertainty around US trade tariffs is making it very difficult for businesses to plan ahead, to understand taxes, prices, and margins, and they predict an impact on sales which will in turn hit the UK economy (BCC 2026). This environmental volatility means that businesses require even more support to be adaptable and resilient exporters, including services. Therefore, better understanding the needs of service firms is of vital importance (Baldwin et al., 2024).

2.2 Research Questions

The aim of this study is to explore the characteristics of SME service exporters in the UK by tackling three main research questions:

1. Research Question 1: Understand **who** the exporters of services are by characteristics including gender, ethnicity, location, business size, experience, and ownership type.
2. Research Question 2: Determine **how** business support (e.g., business advice and external finance) influences the intention and behaviour of SMEs to expand abroad.
3. Research Question 3: Define **what** types of obstacles affect the performance of exporters of services and the role of export promotion services in overcoming these barriers to trade.

2.3 Structure of the Research Paper

This report is organised into five sections. Section one reviews the literature on service exports, identifies key gaps in the existing evidence base, and develops the study's hypotheses. Section two outlines the study's quantitative, longitudinal research design, including the variables, data sources, and empirical models used to test these hypotheses. This study draws on data from the Longitudinal Small Business Survey (LSBS) to examine the characteristics, business support experiences, obstacles, and export intensity, of UK SMEs engaged exclusively in service exporting. The primary analysis focuses on service-only exporters, while comparative specifications assess differences between service-only and product-only exporters, with hybrid exporters included in selected additional analyses. Section three presents the findings, reporting the characteristics of UK service exporters and examining the support landscape and barriers they encounter, before comparing these results with evidence from previous studies. This section also synthesises the inferential findings using an exploratory systems-thinking approach. The resulting causal map integrates the relationships examined among service-exporting activity, business obstacles, access to external finance, use of business advice or support, and export intensity. Section five concludes by summarising the main findings, discussing their policy implications, and offering recommendations for future research and action.

3. Literature Review

Although services account for the majority of global trade, they have historically received limited attention within International Business scholarship (Blagoeva et el., 2020; Kundu & Lahiri, 2015). Notably, clear definitions, classifications, and measures of the contribution of services to national economies remain underdeveloped and subject to debate (Kowalkowski, et al., 2017). This gap stems, in part, from the increasing integration of service and manufacturing activities within global value chains (Rammal et al., 2022). Furthermore, services differ from manufacturing in that firms may engage in international commercial activities without leaving their home market or directly exporting their services, owing to the multiple modes through which services can be delivered and consumed internationally (OECD, 2024).

This broader neglect of services within the international business literature is mirrored, and arguably compounded, at the national policy level. In the UK context, for example, while the economic effects of Brexit on goods trade have been extensively examined, its impact on the services sector has received comparatively less attention (Du et al., 2026). This is particularly significant because the services sector dominates the UK economy, accounting for around 79% of GDP in 2025 (UK Government, 2025), employing over 80% of the workforce (UK Parliament, 2026), and generating a substantial trade surplus through services exports that continues to offset persistent deficits in goods trade. As such, services play a central role in productivity growth, high value-added activities, and job creation across the UK economy.

3.1 Export service firm characteristics

In practice, the WTO's General Agreement on Trade in Services (GATS) defines four modes through which services are traded internationally. Mode 1 involves services delivered across borders (e.g., online consulting), Mode 2 occurs when consumers travel abroad to obtain services (e.g., tourism), Mode 3 refers to companies establishing a commercial presence in another country (e.g., foreign bank branches), and Mode 4 entails professionals temporarily moving abroad to provide services (e.g., consultants or engineers) (WTO, 2024). However, this classification has been problematic due to the lack of data reported for Mode 4 (Baldwin et al., 2024).

Despite this classification for measuring international trade in services, challenges at the policy level also persist at the firm level. Service firm internationalisation has often not been adequately differentiated from that of goods-producing firms (Pla-Barber and Ghauri, 2012). As Brandl et al. (2025) note, this conceptual ambiguity, combined with the diversity of contexts, organisational arrangements, actor relationships, and value creation processes in international services, has constrained evidence-based policymaking and the development of targeted interventions. Previous studies have traditionally examined whether services differ from goods and have identified key characteristics that distinguish services from goods. Services are characterised by intangibility, as they cannot be physically touched or examined before purchase; inseparability, because production and consumption occur simultaneously; heterogeneity, as service quality may vary across providers and situations; perishability, since services cannot be stored for future use; and the absence of ownership transfer, as customers receive benefits or experiences rather than ownership of a tangible asset (Lovelock & Gummesson, 2004). While not all services display each of these characteristics, most exhibit at least some of them (Pla-Barber and Ghauri, 2012).

Other studies have started to include other dimensions and characteristics to understand service exports. Amongst these dimensions, actor interactions have attracted increasing attention, particularly regarding the underrepresentation of women in international trade (e.g., Arshed et al., 2025, 2026). Krenz (2026), for instance, identifies a gendered export paradox. Although women achieve higher productivity than male exporters, firms with female ownership or predominantly female workforces are significantly less likely to export. This can be explained due to gender-based barriers and demand-side discrimination in international markets (Carbonero et al., 2021; Garg and Shastri, 2022).

In addition to gender, ethnicity constitutes another dimension along which disparities in services trade may emerge, particularly through the lens of migration. Nevertheless, this gap also persists in the migration–trade literature, in which most existing studies have centred on goods trade (Hatzigeorgiou & Lodefalk, 2021). Regarding the immigration-trade literature and how migrants enable trade of services between their country of origin and country of residence, it has been found that migrants are able to reduce information asymmetries and costs for importing and exporting (Cai et al., 2021). Furthermore, migrant networks support the expansion of digital trade, strengthening knowledge flows, innovation, and digital economic interaction across national borders (Cantwell and Shukla, 2025; Cantwell and Marra, 2024).

3.2 Export support and promotion

Export intensity is commonly defined as the proportion of total sales generated through exports (Love et al., 2016). Previous research has demonstrated that concentrating multiple export promotion services on a single firm tends to boost exports more than spreading single interventions across many firms (Broocks and Biesebroeck, 2017). These findings of support intensity for export outcomes, highlight the fact that exporting is a complex, multi-stage process that benefits from intervention at several points along the way (Department of International Trade, 2021).

Governments have established trade promotion organisations to help firms overcome information barriers to internationalisation. These organisations promote export development through advisory support, financial assistance, trade missions, trade fairs, and the implementation of export promotion initiatives and agendas (Volpe Martincus & Carballo, 2010). Their primary objective is to support firms' expansion into international markets by strengthening competitiveness, increasing profitability, and enhancing employment creation capacity (Freixanet et al., 2021). Although previous research has explored the impact of export promotion activities on internationalisation outcomes, limited attention has been paid to determining which forms of support are most effective for fostering exports in service industries (Volpe Martincus & Carballo, 2010).

UK-based evidence from Rincón-Aznar et al., (2015) suggests that export promotion services positively affect firm-level internationalisation, contributing to a higher share of turnover derived from overseas markets. However, these findings are limited by the study's methodology. It did not differentiate between goods and services and systematically excluded SMEs, introducing self-selection bias (Department of International Trade, 2021). Furthermore, there is limited understanding for how specific promotion actions relate, in a disaggregated way, to different export performance outcomes and SME export strategies (Freixanet, 2012; Chopra et al., 2024). This gap constrains the practical value of existing findings for policymakers seeking to allocate resources across different support mechanisms.

A number of studies have examined how external business advice can help reduce barriers when SMEs seek to expand abroad. For instance, Freixanet (2012) finds that advice enables SMEs' internationalisation by promoting access to export knowledge and market research intelligence in the early stages of internationalisation. Furthermore, Coudounaris (2018) argues that the use of export promotion programmes is positively associated with SME export performance. Han and Park (2019) demonstrate that information-based export assistance improves firms' global value chain knowledge, which subsequently contributes to stronger export outcomes. A recent systematic review by Calheiros-Lobo et al. (2023) identifies access to external knowledge, information, and networks as important determinants of export performance and export intensity among SMEs.

Given that service-exporting SMEs are particularly reliant on specialised knowledge, market information, and international networks to deliver and commercialise their services abroad, the use of business advice and information is expected to facilitate deeper engagement in foreign markets and increase the proportion of sales generated from exports. Therefore, it is hypothesised that:

H1: Amongst service-exporting SMEs, the use of business advice or information is positively associated with service export intensity.

Additionally, export market entry typically entails substantial sunk and upfront costs (Das et al., 2007), access to finance is considered a key determinant of internationalisation. Financial resources enable firms to overcome entry barriers and support the investments required to establish and expand export activities (Manova, 2013; Muûls, 2008). Financial support also plays an important role in helping export activities and improving export performance among SMEs (Freixanet et al., 2021). Consequently, firms that secure external finance may be better positioned to increase their export sales and strengthen their presence in international markets. Considering, previous research suggests that access to finance can enhance firms' export capabilities, facilitate opportunity recognition, and improve international performance by increasing firms' ability to navigate foreign markets, this leads to the following hypothesis:

H2: Service exporters who use external finance are more likely to have higher export intensity.

3.3 Export Barriers

The OECD's most recent report on SMEs listed four main barriers for exporting: access to credit and finance, (2) labour and skills shortages, (3) integration into international markets and global value chains, and (4) problems adapting to a fluctuating trade environment (OECD, 2024). However, firms in the service industry, particularly those operating in knowledge-intensive industries, tend to face fewer obstacles to international expansion than manufacturing firms (Contractor et al., 2003, 2007). One reason is that services can internationalise rapidly without requiring substantial physical infrastructure (Bell, 1995). Unlike manufacturing companies, service firms rely more heavily on intangible assets such as knowledge, reputation, and people-centred networks and relationships rather than on physical production resources (Li et al., 2024). In addition, advances in digital technologies have lowered the costs of operating across borders and facilitated international growth, especially for firms whose services can be delivered electronically (Baldwin et al., 2024; Meyer et al., 2023). Given the lower dependence on physical assets, greater reliance on intangible resources, and the opportunities afforded by digitalisation, service firms are generally better positioned to overcome barriers to international expansion. Accordingly, we hypothesise that:

H3: Service exporters are less likely to report obstacles compared to product exporters.

Previous studies have demonstrated that limited access to finance represents a significant obstacle to export activity, restricting firms' capacity to expand internationally (Greenaway et al., 2007). In contrast, firms with access to external finance tend to achieve higher export volumes, highlighting the importance of financial resources for export performance (Du & Girma, 2007). Furthermore, Leonidou (2000) identifies the scarcity of financial resources among new exporters as a key barrier to internationalisation. Given that firms require funds to conduct market research, identify potential markets and customers, and adapt their marketing plans to overseas contexts (Minetti et al., 2015), we hypothesize that:

H4: Service-exporting SMEs that use external finance are less likely to report major business obstacles than service-exporting SMEs that do not use external finance.

Prior research suggests that export assistance programmes help SMEs overcome information deficiencies, develop export capabilities, strengthen risk-management practices, and navigate foreign market requirements (Catanzaro & Teyssier, 2020). Additionally, advisory support has been shown to help firms address barriers associated with market knowledge, regulations, and international business development (Department for International Trade, 2022). Therefore, service exporters that receive advice or support are expected to perceive fewer business obstacles than those that do not receive such assistance.

H5: Service exporters receiving advice are less likely to report major business obstacles than service exporters that do not receive advice.

3.4 Summary and Gaps

Despite the growing importance of services in global trade and their dominant contribution to the UK economy, research on service exports remains underdeveloped compared with goods trade. Existing studies have highlighted the distinctive characteristics of services and the multiple modes through which they are traded internationally. However, limited understanding remains of how the export behaviour of service firms differs from that of manufacturing firms. This lack of differentiation has contributed to conceptual ambiguity and constrained the development of evidence-based policies tailored to service exporters.

This study addresses three key gaps in the literature. First, it responds to the limited evidence on the characteristics of service-exporting firms, particularly regarding gender, migration, and other firm-level factors influencing export activity in the UK. While research has begun to explore gender- and migrant-related dimensions of trade, existing evidence remains fragmented and largely focused on goods exports.

Second, there is limited understanding of which export support mechanisms, particularly business advice and external finance, are most effective in enhancing the export performance of service-exporting SMEs. Although export promotion programmes have been widely studied, evidence regarding their impact on export intensity among service exporters remains scarce.

Third, there is a lack of evidence on the barriers faced by service exporters, the extent to which support mechanisms help overcome these barriers, and the implications of export obstacles. While service firms are often assumed to face fewer internationalisation barriers due to their reliance on intangible assets and digital delivery channels, empirical comparisons between service and goods exporters remain scarce.

In response to these gaps, this study examines the characteristics of UK service exporters, investigates the relationship between export support mechanisms and export intensity, and analyses the barriers faced by service-exporting SMEs. By focusing specifically on service exporters and distinguishing them from goods exporters, the study contributes to a more nuanced understanding of service-sector internationalisation and provides evidence to inform UK export promotion policy.

4. Methodology

4.1 Research Design

This study adopts a quantitative, longitudinal research design using data from the Longitudinal Small Business Survey (LSBS) to examine the characteristics, business support experiences, business obstacles, and export intensity of UK SMEs engaged exclusively in service exporting. The primary analytical population comprises service-only exporters, defined as businesses that reported exporting services but not goods or products in the corresponding survey year. The study draws on ten annual survey waves covering the period from 2015 to 2024. Because some businesses participated in multiple waves, whereas others were observed in only one or a limited number of years, the resulting dataset constitutes an unbalanced panel. The unit of analysis is the firm-year observation, such that a business may contribute one observation for each survey year in which it participated and provided valid information for the variables required by the relevant analysis. The principal descriptive and inferential findings are based on service-only exporters. A broader sample comprising all service exporters, including businesses that also exported goods, is used primarily for robustness and sensitivity analyses. Product-only exporters are included where a research question requires a direct comparison between service-only and product-only exporters, particularly in the analysis of reported business obstacles. Businesses exporting both services and products are also included in selected exporter-type comparisons, while non-exporters are considered only where relevant to contextual descriptive analysis.

The first stage addresses Research Question 1 by developing a descriptive profile of service-only exporting SMEs. It examines firm size, business age, export experience, sector, location, ownership and leadership, service export intensity, external finance, business advice or support, reported obstacles, and export destinations. Where relevant, service-only exporters are compared with goods-only and mixed goods-and-services exporters to contextualise their characteristics and exporting profiles. Particular attention is given to women-owned, women-led, and Minority Ethnic Group-led businesses, without inferring differential effects unless supported by dedicated subgroup or interaction models.

The second stage addresses Research Question 2 by examining whether business advice and external finance are associated with service export intensity. Service export intensity is measured continuously as the percentage of turnover generated by service exports and categorically as high, medium, or low intensity. The analysis considers general and export-specific advice, grouped finance measures, and individual advice and finance types. Linear mixed-effects and mixed-effects logistic models are estimated with firm-level random intercepts. The primary sample comprises service-only exporters, while all service exporters are included in robustness analyses. Lagged models improve temporal ordering by relating earlier advice and finance measures to subsequent service export intensity.

The third stage addresses Research Question 3 by examining the business obstacles experienced by service-only exporters. The primary analyses focuses on service-only exporters, while comparative specifications assess differences between service-only and product-only exporters, with hybrid exporters included in selected additional analyses. First, the analysis examines whether service-only exporters differ from other exporter groups in the likelihood of reporting at least one obstacle, the number of obstacles reported and the likelihood of reporting each individual obstacle. Second, within the service-only exporter group, it evaluates whether access to external finance and the use of business advice or support are associated with these obstacle outcomes. Corresponding analyses covering the wider population of service exporters, including hybrid exporters, are used as robustness checks. Third, business obstacles are measured using the LSBS indicators of major obstacles to business success, including access to finance, taxation, recruitment and skills, regulation, premises, competition, workplace pensions, late payment, Brexit-related challenges, the National Living Wage, COVID-19, energy prices and other cost pressures. These indicators capture general constraints on business success and should not be interpreted as exclusively export-specific barriers.

Finally, the findings from the inferential analyses are synthesised through an exploratory systems-thinking approach informed by Meadows (2008) and Sterman (2000). The resulting causal map integrates the relationships examined among service-exporting activity, business obstacles, access to external finance, the use of business advice or support, and export intensity. Statistically supported associations provide the empirical basis for selected connections in the map, while theoretically plausible mechanisms, including firms' needs for finance or support, investment capacity and organisational capabilities, are incorporated to help explain how these elements may interact within the wider system of service-exporting SMEs. The map distinguishes among statistically significant associations, non-significant relationships and connections proposed primarily on theoretical grounds. It is therefore used as an exploratory framework for synthesising and interpreting the quantitative findings, rather than as evidence that the direction or causal nature of each relationship has been empirically established.

4.2 Data Sources

This investigation uses data from the Longitudinal Small Business Survey (LSBS), a large-scale survey commissioned by the UK Government's Department for Business and Trade (2025). The principal analyses focus on service-only exporting SMEs, defined as businesses that report exporting services but not products in the corresponding survey year. Additional analyses include SMEs exporting both services and products, product-only exporters and non-exporters, depending on the research question and model specification. Because businesses may report exporting both services and products, the original service-export and product-export indicators are not mutually exclusive. These indicators are therefore combined to classify each business-year observation into one of four mutually exclusive categories: non-exporter, product-only exporter, service-only exporter, or exporter of both services and products (e.g., Ariu, 2016; Gkypali et al., 2018).

The LSBS collects information from owners, managing directors and other senior managers of private-sector businesses across the United Kingdom through telephone interviews. It covers business performance, employment, turnover, exporting, innovation, external finance, business advice and support, and obstacles to business success. Conducted annually since 2015, the survey incorporates a longitudinal component that enables participating businesses to be followed across multiple waves (Department of Business and Trade, 2025). For this investigation, data from all ten waves, covering 2015 to 2024, were combined into a single research dataset. The original wide-format research file contains 104,164 business records, with year-specific variables storing the information available for each business in each relevant survey wave. This total should not be interpreted as the official sample size for an individual LSBS wave. The official 2024 sample comprised 10,611 businesses, of which 6,304 had participated in at least one previous wave and 3,381 were identified as new entrants. Across the full ten-wave period, 348 businesses participated in every wave. These different participation patterns illustrate the unbalanced longitudinal structure of the LSBS: some businesses are observed repeatedly, whereas others appear in only one or a small number of waves.

Across the pooled 2015–2024 dataset, 12,175 firm-year observations were classified as involving service-exporting SMEs. Of these, 8,703 were service-only exporting observations, in which an SME reported exporting services but not products in the corresponding survey year. The remaining 3,472 observations related to SMEs reporting both service and product exports. Service-only exporters therefore accounted for approximately 71.5% of all service-exporting firm-year observations, while exporters of both services and products accounted for approximately 28.5%. The wide-format data were reorganised into long format so that each row represents one business-year observation. A business participating in more than one survey wave can therefore contribute several observations, while another business may contribute only one. This creates an unbalanced panel that supports both cross-sectional comparisons and longitudinal analyses. The number of observations used in each statistical model is lower than the total number of records because of differences in questionnaire coverage, cohort assignment, item non-response, and the availability of particular variables across years.

Table 1 summarises the principal LSBS variables used to construct the measures included in this investigation. It identifies the corresponding variable names in the original dataset, the categories or information recorded and the analytical role of each measure. Several measures used in the statistical analyses, including exporter type, finance groupings, obstacle measures and turnover per employee, were derived by combining or transforming original LSBS variables. Appendix A provides further details on variable construction, harmonisation across survey waves and the additional identifiers and year-specific variables used to restructure the dataset into long format.

Table 1. Summary of key variables

Construct	LSBS variable	Measurement or categories
Export status and exporter type	C1, C2; derived exporter-type variable	C1 records whether the business exports services: 1 = yes; 2 = no. C2 records whether the business exports goods/products: 1 = yes; 2 = no. The two indicators are combined to classify each business-year observation as a non-exporter, product-only exporter, service-only exporter, or exporter of both services and products.
Export intensity	C1A, C1B, C2A, C2B	Service exports as a percentage of turnover; grouped service-export share; product exports as a percentage of turnover; and grouped product-export share.
Export development and intentions	C3, C3BA, C4, C4A, C4_A, C5, C7	Plans to begin exporting; year first exported**; number of years exporting; plans to increase exports; formal written export strategy******; continuity of overseas sales; and plans to begin exporting under the revised question*****.
Export destinations	C2CA to C2CJ, depending on survey wave	European Union*; non-EU countries*; United States***; EFTA countries***; Canada***; Turkey***; South Korea***; China***; India***; other international destinations***; and Republic of Ireland********. Each destination is recorded as a separate selected or not-selected indicator, and businesses may report more than one destination.
Firm size and business age	A2, A2BND, A6SUM	Number of payroll employees; employment-size bands; and business-age categories.
Sector and location	SIC1DIG, NATION, GOR	One-digit SIC 2007 industry sector; UK nation; and UK regional category.
Ownership and leadership	A12, A21, A22, WLED, MLED	Family-owned business; more than 50% women-owned; ethnicity of the sole owner; women-led business; and Minority Ethnic Group-led business.
External finance	Relevant H3 finance items; derived finance-group variables	Bank overdraft; commercial mortgage; credit card; bank loan; leasing or hire purchase; invoice finance; equity finance; grant; peer-to-peer finance; family or friend loan; partner, director or owner finance; and other external finance. Each type is recorded separately.
Major business obstacles	G2A to G2M, depending on survey wave; derived any-obstacle and obstacle-count measures	Obtaining finance; taxation; recruitment and skills; regulation or red tape; premises; competition; workplace pensions; late payment; Brexit-related challenges*; National Living Wage*; COVID-19*****; energy prices*******; and other cost pressures*******. Each obstacle is recorded as a separate selected or not-selected indicator.

Notes: categories without an asterisk were first available in the 2015 LSBS wave. The number of asterisks identifies the first year in which a category appeared: * 2016; ** 2017; *** 2018; **** 2019; ***** 2020; ****** 2021; ******* 2022; ******** 2023; and ********* 2024. The indicated starting year does not necessarily mean that the item was administered continuously in every subsequent wave.

4.3 Analytical Methods

4.3.1. Analytical Strategy

The empirical analysis followed a staged quantitative strategy that combined descriptive statistics with pooled regression, logistic regression, linear mixed-effects, and generalised linear mixed-effects models, as well as lagged specifications (Gelman & Hill, 2007; Rabe-Hesketh & Skrondal, 2022;

Wooldridge, 2010). The statistical method used in each analysis was selected based on the measurement scale and distribution of the dependent variable, the structure of the analytical sample, and the availability of repeated observations for individual businesses in the LSBS.

The analysis was organised around an initial descriptive stage followed by the testing of six hypotheses. The descriptive analysis addressed Research Question 1 by characterising service-exporting SMEs and comparing them with relevant exporter and non-exporter groups. Hypotheses H1 and H2 addressed Research Question 2 by examining whether business advice and support and external finance were associated with service export intensity. Hypotheses H3 to H6 addressed Research Question 3. These hypotheses examined whether exporter type, external finance and business advice or support were associated with the incidence, number and type of business obstacles reported.

Within each hypothesis, the models followed a progressive structure. The initial specification generally examined the most aggregated explanatory measure, such as any advice, any external finance or any reported obstacle. Subsequent specifications replaced or supplemented the aggregate measure with conceptually narrower groupings, individual components or interaction terms. Where the data permitted, lagged specifications were estimated to examine whether an explanatory variable observed in an earlier firm-year was associated with an outcome observed subsequently. Alternative outcome definitions, model structures and analytical samples were also used as robustness checks. The primary models focused only on service exporters, while the rest of the models expanded the sample to include all service exporters for comparisons and robustness tests.

The multivariate models included business-level and calendar-year controls where the relevant variables and sufficient observations were available. Random-intercept models were used where repeated observations and the estimated variance structure supported their inclusion (Cassiman & Golovko, 2011). When the firm-level random effect was not supported by the data or produced estimation instability, a more parsimonious pooled model was used and the implications of that decision were considered when interpreting the results. All models were treated as estimating adjusted statistical associations (Breinlich & Criscuolo, 2011).

4.3.2. Descriptive analysis

The analysis began with descriptive statistics to characterise service-exporting SMEs and compare them with relevant exporter and non-exporter groups. The principal descriptive profile distinguished service-only exporters from SMEs exporting both services and products. Where relevant, comparisons also included product-only exporters and non-exporters. Frequencies, percentages and cross-tabulations were used to examine categorical variables, while means, standard deviations and distributions were examined for continuous variables (e.g., Ariu, 2016; Cassiman & Golovko, 2011).

The characteristics considered included employment size, business age, industry sector, nation and region, family ownership, women-owned and women-led status, minority ethnic group leadership, business advice and support, external finance and reported business obstacles. Service export intensity and turnover per payroll employee were examined as continuous measures, with their distributions assessed to identify variation, potential skewness and extreme values. Because the availability of some variables differed between LSBS waves, the number of valid business-year observations was reported for each descriptive analysis where appropriate.

These descriptive analyses addressed Research Question 1 by providing an initial account of the composition, economic characteristics and business circumstances of service-exporting SMEs. They also informed the construction of analytical variables, the selection of comparison groups and the specification of the multivariate models. However, descriptive differences were not interpreted as adjusted associations or causal effects. The regression and mixed-effects models presented in the subsequent stages therefore provided the principal inferential evidence for Research Questions 2 and 3.

4.3.3. Dependent Variables and selection of model

The statistical models were selected according to the measurement and distribution of the dependent variable, the structure of the analytical sample and the availability of repeated observations for individual businesses (Breinlich & Criscuolo, 2011). The analyses included continuous outcomes, a numerical obstacle-count outcome, binary outcomes and outcomes examined using lagged predictors. Linear regression and linear mixed-effects models were used for outcomes analysed on a continuous scale, while logistic and mixed-effects logistic models were used for binary outcomes. Lagged specifications retained the model family appropriate to the outcome but related an earlier value of the explanatory variable to a subsequently observed outcome (Wooldridge, 2010).

Continuous outcomes

Three outcomes were analysed using linear models: service export intensity, and the number of reported business obstacles. Service export intensity was measured as the percentage of annual turnover generated by service exports (Ganotakis & Love, 2012). It was analysed only among SMEs reporting service exports in the corresponding survey year because a positive service export intensity is not substantively applicable to businesses that did not export services. The continuous service export-intensity measure was used to estimate adjusted differences in the percentage of turnover derived from service exports.

The number of business obstacles was calculated by summing the valid individual obstacle indicators available for each business-year observation (e.g., Leonidou, 1995). Although the resulting measure consists of non-negative integer values and is therefore formally a variable, it was analysed using linear mixed-effects models. This approach was used to estimate adjusted mean differences in the number of obstacles reported while accounting for repeated observations of the same business. The coefficients from these models are therefore interpreted as adjusted differences in the expected number of reported obstacles, rather than as incidence-rate ratios. The measure is consistently described as an obstacle-count outcome analysed using a linear mixed-effects model, rather than as a count-regression model.

Binary outcomes

Binary outcomes were analysed using logistic or mixed-effects logistic regression, depending on whether the data supported a firm-level random intercept (Wooldridge, 2010). The outcomes were: (1) high service export intensity; (2) reporting at least one major business obstacle; and (3) reporting each individual obstacle.

High service export intensity was derived from the grouped service-export share measure and coded as 1 for the high-intensity category and 0 for the remaining valid categories. The any-obstacle variable was coded as 1 when a business reported at least one valid obstacle and 0 when it reported none of the obstacles available in the corresponding survey wave. Each individual obstacle was similarly coded as a separate binary variable.

Separate logistic models were estimated for individual obstacles to identify whether aggregate associations were concentrated in particular business constraints. These models were treated as exploratory because of multiple comparisons and, in some cases, sparse observations. Mixed-effects logistic regression was generally used to account for repeated observations, except for the preferred H3 any-obstacle specification, for which standard logistic regression was used because the estimated firm-level random-intercept variance approached zero. Results from the logistic models are reported as odds ratios with 95% confidence intervals.

Lagged outcomes and predictors

Lagged models related predictors observed in an earlier firm-year to outcomes observed subsequently. They were used to examine the temporal ordering of advice and support, external finance, exporter type and obstacle reporting (Cassiman & Golovko, 2011). Analyses were restricted to businesses with valid observations in the periods required to link an earlier predictor with a later outcome. Although these models establish that the predictor preceded the outcome, they do not demonstrate causality or eliminate potential bias from omitted variables, panel attrition or non-random selection.

4.3.4 Linear mixed-effects models

Linear mixed-effects models were used for continuous outcomes and for the numerical obstacle-count measure (Brown, 2021). The general specification of these models is presented in Equation 2.

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta' C_{it} + \gamma' Year_t + u_i + \varepsilon_{it} \quad (2)$$

Where Y_{it} represents service export intensity, the number of business obstacles reported, or turnover per payroll employee for business $i$in year t. X_{it} represents the principal explanatory variable, such as advice or support, external finance, exporter type or obstacle reporting. $\boldsymbol{C}_{it}$ is a vector of control variables, and Year_t represents categorical survey-year effects. The firm-level random intercept, u_i, accounts for correlation between repeated observations of the same business and captures unobserved time-invariant differences between firms. The observation-level residual is represented by ε_{it}.

The coefficient β_1 represents the adjusted difference in the expected outcome associated with a one-unit change or category difference in the principal explanatory variable (Galecky & Burzykowski, 2012). In models of the obstacle count, it represents the adjusted difference in the mean number of obstacles reported. The coefficients from these models are not interpreted as incidence-rate ratios.

4.3.5 Logistic and mixed-effects logistic models

Logistic models were used when the dependent variable was binary (Gibbons et al., 2010). The general mixed-effects logistic specification is presented in Equation 3.

$$logit[P(Y_{it} = 1)] = \beta_0 + \beta_1 X_{it} + \beta' C_{it} + \gamma' Year_t + u_i \quad (3)$$

Where $Y_{it} = 1$ represents high service export intensity, reporting at least one major business obstacle, or reporting a particular obstacle. The remaining terms are defined as in Equation 3, and u_i represents the firm-level random intercept. Exponentiated coefficients are reported as odds ratios. An odds ratio above one indicates higher odds of the outcome, while an odds ratio below one indicates lower odds, conditional on the other variables.

For H3, mixed-effects logistic models initially produced Hessian warnings, while the estimated firm-level random-intercept variance approached zero. This indicated that the random effect was not supported and could not be estimated reliably. The preferred H3 any-obstacle model was therefore re-estimated using standard logistic regression as presented in Equation 4:

$$\text{logit}[P(Y_{it} = 1)] = \beta_0 + \beta_1 X_{it} + \beta' C_{it} + \gamma' Year_t \quad (4)$$

Removing the random intercept produced a more parsimonious and stable specification. The mixed-effects results were retained as diagnostic checks, while the standard logistic model provided the principal H3 estimates. Because this model does not explicitly account for residual correlation

between repeated observations of the same business, its results are interpreted as adjusted associations rather than causal effects.

4.3.6 Lagged models

Lagged models examined whether a predictor observed in the previous firm-year was associated with a subsequently observed outcome (Wooldridge, 2010). For continuous outcomes, the general specification was defined as in Equation 5:

$$Y_{it} = \beta_0 + \beta_1 X_{i,t-1} + \beta' C_{i,t-1} + \gamma' Year_t + u_i + \varepsilon_{it} \quad (5)$$

For binary outcomes, the same temporal structure was estimated using a logit link as in Equation 6:

$$\text{logit}[P(Y_{it} = 1)] = \beta_0 + \beta_1 X_{i,t-1} + \beta' C_{i,t-1} + \gamma' Year_t + u_i \quad (6)$$

Here, $X_{i,t-1}$ represents the previous observed value of advice or support, external finance, exporter type or obstacle reporting. Where available, $\boldsymbol{C}_{i,t-1}$ contains lagged control variables, while Year_t controls for conditions in the outcome year. The analyses were restricted to businesses with the observations required to link an earlier predictor to a later outcome. Although these models strengthen temporal ordering, they remain observational and do not establish causal effects.

4.3.7 Interaction models

Interaction terms were included selectively to examine whether key associations varied across time or industry. In the external-finance analysis, finance-by-year interactions assessed whether the relationship between finance and service export intensity differed across survey years as represented in Equation 7:

$$Y_{it} = \beta_0 + \beta_1 Finance_{it} + \beta' C_{it} + \gamma' Year_t + \delta'(Finance_{it} \times Year_t) + u_i + \varepsilon_{it} \quad (7)$$

Lagged interaction models replaced contemporaneous finance with its previous observed value.

4.3.8 Control variables

The adjusted models included a common set of business-level and time controls wherever the relevant variables and sample sizes permitted.

- **Firm size.** Firm size was measured by the number of payroll employees. It was included because business size may be associated with organisational resources, access to finance, internationalisation capacity, and obstacle reporting.
- **Business age.** Business age captured organisational maturity and accumulated experience. Older businesses may have more established resources, networks and procedures, while younger firms may differ in their growth orientation, financing needs and exposure to business constraints.
- **Industry sector.** Sector was measured using the one-digit SIC 2007 classification. It was included because export opportunities, financing requirements, regulatory exposure and labour use vary across industries. However, sector was excluded from the preferred H3 specification because its inclusion contributed to estimation instability.
- **Nation.** UK nation was included to account for observed differences in business environments, institutions, market access and support systems across England, Scotland, Wales and Northern Ireland.

- **Calendar year.** Calendar-year terms controlled for period-specific conditions affecting businesses, including macroeconomic changes, Brexit-related developments, the COVID-19 pandemic, inflation and changing energy costs. Year was generally included as a categorical fixed effect to control flexibly for differences between survey waves.

The exact control-variable specification varied when variables were unavailable, sample sizes were insufficient, or more complex categorical specifications produced estimation problems. The controls included in each model are therefore reported alongside the corresponding results.

4.3.9 Hypothesis-specific model sequence

Table 2 summarises the principal models used to test each hypothesis. Aggregate measures were examined first, followed where relevant by disaggregated, lagged, interaction and alternative-sample specifications.

Table 2. Summary of hypothesis-specific models

Hypothesis	Principal relationship	Outcome	Main model
H1	Business advice and support and service export intensity	Continuous and high service export intensity	Service exporters; linear and logistic mixed-effects models
H2	External finance and service export intensity	Continuous and high service export intensity	Service exporters; linear and logistic mixed-effects models
H3	Exporter type and business obstacles	Any obstacle, number of obstacles and individual obstacles	Exporter groups; standard logistic regression for the preferred any-obstacle model and linear mixed-effects models for obstacle number
H4	External finance and business obstacles	Any obstacle, number of obstacles and individual obstacles	Service-only exporters; logistic and linear mixed-effects models
H5	Business advice and support and business obstacles	Any obstacle, number of obstacles and individual obstacles	Service-only exporters; logistic and linear mixed-effects models

Notes. Mixed-effects models included a firm-level random intercept were supported by the data. For H3, standard logistic regression was preferred for the any-obstacle outcome because the estimated random-intercept variance approached zero. Individual finance, advice and obstacle models were treated as exploratory where they involved multiple comparisons or sparse categories. Alternative samples and lagged specifications were used as supplementary or robustness analyses.

4.3.10 Software and statistical inference

Data preparation, descriptive analysis and model estimation were conducted using IBM SPSS Statistics. SPSS syntax was used to restructure the data, construct the analytical variables, define the analytical samples and estimate the regression and mixed-effects models. Statistical inference was based on regression coefficients, standard errors, 95% confidence intervals and *p*-values. Odds ratios were reported for logistic models. A conventional threshold of $p < .05$ was used to identify statistical significance (Wasserstein & Lazar, 2016). However, findings were interpreted by considering the direction, magnitude and precision of the estimates, together with their consistency across alternative specifications. Results from models affected by sparse observations, estimation instability or multiple comparisons were treated as exploratory rather than conclusive evidence.

4.4. Causal map

The findings from the descriptive and inferential analyses were synthesised through an exploratory causal-mapping approach informed by systems thinking and system dynamics (Meadows, 2008; Sterman, 2000). Causal maps integrate variables and directional relationships into a wider representation of a system, helping to identify indirect pathways, potential feedback structures and connections that may be less apparent when statistical relationships are considered separately. Previous applications demonstrate their value for integrating fragmented evidence and developing coherent system-level explanations (Ríos-Ocampo and Gary, 2025a, 2025b; Ríos-Ocampo et al., 2026).

The map was developed after completing the statistical analyses and focused on the relationships among service-exporting activity, external finance, business advice and support, business obstacles, and service export intensity. Its construction followed a triangulation principle adapted from Uleman et al. (2024), whereby different sources of evidence are integrated while their origin and degree of support remain explicit. It was also informed by Alvarado et al. (2023), who show how causal loop diagrams can combine empirical evidence with intermediate mechanisms and potential feedback relationships to formulate systems-informed research propositions. Unlike Uleman et al. (2024), however, this investigation did not employ group model building or formal causal-discovery algorithms.

The statistical results were used to determine the empirical support and provisional polarity of selected connections. Positive coefficients, or odds ratios above one, informed positive links, while negative coefficients, or odds ratios below one, informed negative links. However, regression coefficients were not translated automatically into causal relationships. The direction of each connection was determined by the temporal ordering of the variables, the hypotheses tested and relevant theoretical evidence. This distinction is important because causal interpretation of observational estimates depends on substantive and identification assumptions that cannot be established from statistical associations alone (Pearl, 2012; Rohrer, 2018).

Three types of connection were distinguished in the map: statistically supported associations, relationships examined but not statistically significant, and mechanisms proposed primarily on theoretical grounds. Intermediate constructs, such as investment capacity, need for support and firm capabilities, were included where necessary to explain plausible mechanisms linking the LSBS variables. These constructs were distinguished from variables measured directly or derived from the survey. This procedure is consistent with the use of causal maps to integrate partial explanations and introduce theoretically grounded intermediary connections within a broader system representation (Alvarado et al., 2023; Ríos-Ocampo et al., 2026).

The completed map was examined for potential reinforcing and balancing feedback loops. Nevertheless, these loops represent system-level hypotheses rather than dynamically validated mechanisms. It is therefore used as an exploratory framework for synthesising the quantitative findings, making assumptions explicit and identifying relationships for further investigation, rather than as evidence that every connection represents an empirically established causal effect.

4.5 Limitations

The analytical methods have several limitations. First, the LSBS is an observational survey with an unbalanced longitudinal structure; consequently, the models estimate adjusted associations rather than identified causal effects. Although random-intercept models account for correlation between repeated observations and lagged specifications strengthen temporal ordering, neither approach eliminates potential bias arising from self-selection, reverse causality, unobserved confounding or panel attrition. Second, the number of reported obstacles is a bounded integer variable but was analysed using linear mixed-effects regression. The resulting coefficients therefore represent adjusted mean differences in the number of obstacles reported, although the estimates may be sensitive to departures from linear-model assumptions. Fourth, some binary outcomes were highly imbalanced, some advice and support categories contained few observations, and the availability of obstacle indicators varied across survey years and cohorts. The disaggregated and lagged models

were therefore treated as supplementary analyses, with greater emphasis placed on the aggregate models and the direction, precision and consistency of findings across specifications.

Another limitation of this study is the lack of data that would allow the identification of the stage of internationalisation at which service SME exporters access finance and support. Consequently, the analysis cannot account for potential differences in financing and support needs across stages of the internationalisation process.

The exploratory causal map has additional limitations. Its empirically informed connections are based primarily on adjusted statistical associations, while some intermediate constructs, including investment capacity, export capabilities and the need for support, were not measured directly in the LSBS models. The inclusion and direction of these theoretical connections therefore depend on assumptions drawn from the literature and the proposed temporal ordering of the relationships. Furthermore, a statistically non-significant result does not demonstrate the absence of a relationship, particularly when samples are small, categories are sparse or variables are available only in selected survey waves. Potential feedback loops should similarly be interpreted as hypotheses about the structure of the system, rather than as dynamically validated mechanisms.

Consequently, the causal map was used as an exploratory framework for organising the findings, making the underlying assumptions explicit and identifying relationships requiring further investigation. It should not be interpreted as evidence that every arrow represents an empirically established causal effect. Rather, it presents a structured hypothesis about how external finance, business advice and support, business obstacles, exporting and export intensity may interact within the wider system of service-exporting SMEs.

5. Findings

This section presents the findings in four stages. First, it describes the characteristics and exporting profiles of service-only exporting SMEs, with selected comparisons involving other exporter groups. Second, it examines the associations of business advice and external finance with service export intensity. Third, it assesses differences in business obstacles across exporter types, the associations of finance and advice with obstacle reporting. The principal inferential results focus on service-only exporters, while broader-sample and supplementary analyses are reported in the appendices. Finally, an exploratory causal map synthesises the main empirical findings and theoretically proposed relationships from a systems perspective.

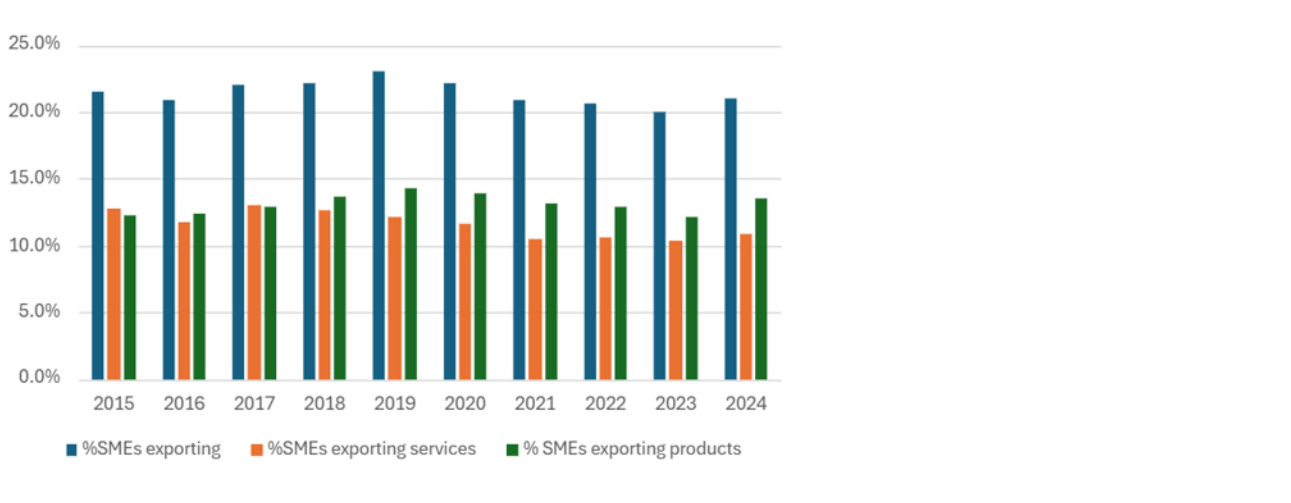
5.1 Characterising Service-Exporting SMEs

The descriptive analysis in this section identifies service exporters using the original service-export indicator (C1 = 1) and product exporters using the corresponding product-export indicator (C2 = 1). These groups are not mutually exclusive, as some SMEs export both services and products. The subsequent regression analysis focuses primarily on service-only exporters.

5.1.1 Export Participation and Firm Size

Figure 1 shows the percentage of UK SMEs reporting exports between 2015 and 2024. The overall share of exporting SMEs remained relatively stable, ranging from 20.0% to 23.1%. It increased from 21.5% in 2015 to a peak of 23.1% in 2019, before declining to 20.0% in 2023 and recovering slightly to 21.0% in 2024. Over the same period, the proportion reporting service exports fell from 12.8% to 10.9%, while the proportion reporting product exports increased from 12.3% to 13.5%. From 2016 onwards, the share reporting product exports was consistently higher than the share reporting service exports, with the difference widening particularly after 2020. These figures indicate a gradual change in the composition of SME exporting activity, although the service and product categories overlap because some SMEs report both forms of exporting.

Figure 1. Percentage of UK SMEs reporting service and product exports, 2015–2024



Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

SMEs reporting service exports were generally more concentrated in the smallest employment categories than SMEs reporting product exports. The proportion with 1–4 employees was higher among SMEs reporting service exports in every year, rising from 15.3% in 2015 to 28.5% in 2023 before falling to 19.8% in 2024. By contrast, SMEs reporting product exports were more strongly

represented in the small and medium-sized categories. Firms with 10–19 employees consistently accounted for a larger share of product exporters, with annual differences of approximately 1.5 to 5.2 percentage points. A similar pattern was observed among firms with 50–99 and 100–249 employees. In 2024, firms with 50–99 employees represented 8.1% of service exporters and 10.5% of product exporters, while firms with 100–249 employees represented 2.8% and 4.8%, respectively. Overall, these descriptive patterns indicate that SMEs reporting service exports tend to be smaller than those reporting product exports.

This size profile is consistent with evidence that fixed export costs influence firms' participation in international markets (Wagner, 2002). It may also reflect the lower physical infrastructure requirements associated with exporting some services, particularly where digital platforms and online delivery channels enable very small firms to reach overseas customers. However, the descriptive results do not establish whether digitalisation explains the observed differences between the two groups.

5.1.2 Sectoral Profile

Figure 2 shows the sector profile between 2015 and 2024. SMEs reporting service exports were concentrated in knowledge-intensive sectors. Professional, Scientific and Technical Activities represented approximately 30–35% of these SMEs between 2015 and 2024, making this the largest sector in every year. Information and Communication was the second-largest sector, accounting for approximately 16–19%. By contrast, SMEs reporting product exports were concentrated in Manufacturing and Wholesale and Retail Trade, which together accounted for approximately 69–77% of the group. Manufacturing represented around 35–39% of SMEs reporting product exports, compared with approximately 10–12% of those reporting service exports. The clearest sectoral differences were therefore the greater representation of professional and scientific activities among service exporters and of manufacturing and wholesale and retail activities among product exporters.

This distribution is consistent with the importance of knowledge, skilled labour and intangible assets in internationally traded services (Savic et al., 2020). However, the results describe the sectoral composition of the two exporter groups and do not directly measure sector-level export propensity or the UK's comparative advantage.

Figure 2: Sector profile, 2015-2024

Year	1 Primary		2.Manufacturing		3.Construction		4.Wholesale / Retail		5.Transport		6.Accommodation / Food		7.Information / Communication	
	% Service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters
2015	1.2	3.4	10.6	39.2	2.1	1.8	8.2	32.6	3.9	1.7	1.1	0.5	17.3	6.8
2016	1.9	3.3	9.6	37.8	2.6	2.5	9.5	35	4.1	1.8	1.7	0.8	19	6
2017	2.4	3.8	9.9	36.8	2.4	2	9.8	34.5	4.2	1.6	1.3	0.6	16.5	5.3
2018	1.3	3.5	11.7	35	2.4	2.2	10.6	36	3.9	3.1	2	0.7	16	6.2
2019	1.4	2.4	10.2	35.2	3.1	1.8	8.8	37.7	5.2	3.4	1.7	0.5	18.3	5.4
2020	1.6	3.3	12.1	35.5	3.7	1.9	9.6	36.8	4.2	2.3	0.9	0.8	16.6	5.4
2021	1.4	3	11.3	37.7	4	2.2	8.8	36	3.9	2	1.1	1	17.1	4.9
2022	1.4	2.9	11.4	38	3.6	2.4	7.6	35.7	3.8	2	1	0.7	18	5.6
2023	1.5	2.8	9.9	36.7	3.4	2.5	7.3	37.6	4.7	1.7	1.1	0.7	16.7	5.1
2024	1.2	1.7	11.3	39.3	3.3	2.2	9.1	33.5	4.9	1.7	0.9	0.5	17.7	5

Year	8.Financial/Real state		9.Professional / Scientific		10.Administrative support		11.Education		12.Health / Social work		13.Arts / entertainment		14.Other services	
	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters	% service exporters	% product exporters
2015	4.6	0.3	32.5	7.3	8.4	2.5	3.2	0.6	1.2	0.4	3	1.5	2.7	1.4
2016	4.3	0.3	29.7	6	9.3	2.5	2.7	0.6	1.1	0.4	2.8	1.6	1.9	1.4
2017	4.4	0.5	29.8	8.6	9	2.7	3.7	0.7	1.2	0.5	3.1	1.1	2.2	1.4
2018	4.1	0.2	30.8	6.9	9.3	3	2.9	0.5	1	0.3	2.7	1.7	1.4	0.9
2019	2.8	0.3	31.9	6.6	9.2	3.1	2.4	0.5	1.3	0.4	2	1.5	1.7	1.5
2020	3.8	0.1	32.4	6.4	7.3	3.2	3.1	0.5	1.2	0.3	2.1	2.1	1.2	1.6
2021	3	0.2	33.5	6.7	7.7	2.8	2.7	0.5	1.4	0.2	2.1	1.5	1.9	1.3
2022	3.5	0.3	35.3	6.3	7.9	2.5	2.5	0.2	0.8	0.2	2.1	1.8	1.4	1.2
2023	2.6	0	35.1	6	9.1	2.5	3.8	0.4	1.2	0.3	1.9	2.6	1.8	1.1
2024	3	0.3	31.6	7.1	7.9	4.1	3.4	0.2	0.9	0.3	3.5	2.7	1.4	1.3

Notes. Percentages show the sectoral composition of SMEs reporting each type of export activity. Service-export and product-export categories are not mutually exclusive because some SMEs report both forms of exporting. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

5.1.3 Ownership and Leadership

Women-majority ownership, defined as women holding more than 50% of the business, fluctuated across the study period. Among SMEs reporting service exports, the recorded share peaked at 16.4% in 2018 before declining to 10.4% in 2024, with a similarly uneven pattern among SMEs reporting product exports. Interpretation of recent years requires caution because the decline in businesses reporting no women-majority ownership coincided with an increase in non-definitive responses. Among SMEs reporting service exports, “Don’t know” responses rose from 15.4% in 2021 to 29.3% in 2024. The change in the “No” category should therefore not be interpreted as evidence of increasing women-majority ownership.

Women-led businesses were slightly more prevalent among SMEs reporting service exports in several recent years. They represented 14.0% of SMEs reporting service exports and 12.2% of those reporting product exports in 2021. The corresponding proportions were 12.5% and 11.8% in 2022, and 13.6% and 12.6% in 2024. Although modest and descriptive, these differences are consistent with evidence that women entrepreneurs are comparatively well represented in knowledge-intensive and service-oriented sectors (Arshed et al., 2025; 2026).

Among businesses with recorded information on the ethnicity of the sole owner, White British owners remained the largest group throughout 2015–2024, accounting for approximately 75–87% of SMEs reporting service exports and 76–92% of those reporting product exports. “Any Other White Background” was generally the second-largest category, representing approximately 4–8% and 2–5% of the respective groups. Among the recorded Minority Ethnic Group categories, Indian sole owners were the largest group in most years, accounting for approximately 0.7–2.0% of SMEs reporting service exports and 0.4–1.9% of those reporting product exports. Other Asian-background categories were also represented, although each generally accounted for less than 1.5% of either group.

Non-response limits the interpretation of these ethnic differences, particularly because “Refused” and “Don’t know” responses increased from around 2018. Nevertheless, the separate Minority Ethnic Group leadership indicator recorded a higher share in 2024 than in 2015. Minority Ethnic Group-led businesses increased from 4.1% to 6.2% among SMEs reporting service exports and from 3.9% to 6.1% among those reporting product exports, despite year-to-year fluctuations. This indicates a modest increase in recorded representation, although changing non-response patterns require caution.

5.1.4 International Market Access

The European Union remained the principal destination for SMEs reporting service exports, although the share serving EU markets declined from 72.9% in 2021 to 64.7% in 2024. Over the same period, participation in the United States, Canada and Rest of World markets remained stable or increased. Approximately half of SMEs with valid destination information reported exporting to two or more markets between 2018 and 2024, with no clear sustained increase over the period. These findings indicate a broad international reach beyond the EU, rather than consistent growth in geographical diversification.

The destination indicators measure the proportion of SMEs exporting to each market, not the monetary value of their exports. The results therefore describe changes in market participation and reach, rather than changes in export value by destination. A valid comparison with SMEs reporting product exports was not available from the destination tables and is therefore not reported.

Service-exporting SMEs are generally smaller, concentrated in knowledge-intensive sectors and active across a broad range of international markets, highlighting a profile distinct from that of goods exporters.

5.2 The role of business advice and finance in service export performance and intensity

5.2.1 Export advice and service export intensity

Table 3 presents the primary tests of H1 among service-only exporters using two alternative measures of service export intensity. General business advice was positively but not significantly associated with continuous service export intensity, $B = 0.709$, 95% CI [−0.442, 1.860], $p = 0.228$. The confidence interval included zero, providing no statistically significant evidence that advice recipients generated a greater proportion of their turnover through service exports.

The binary model produced the same substantive conclusion. General business advice was not significantly associated with the odds of high service export intensity, $OR = 1.107$, 95% CI [0.975, 1.256], $p = 0.117$. Although the estimated odds ratio was above one, the confidence interval included one.

Table 3: Primary models predicting service export intensity among service-only exporters

	Continuous service export intensity (1)	**High service export intensity (2)**
Advice measure	General advice	General advice
Advice effect	$B = 0.709$	$OR = 1.107$
95% CI	[−0.442, 1.860]	[0.975, 1.256]
p-Value	0.228	0.117
Firm-year observations	7,222	7,730
Marginal R^2	0.035	0.037
Conditional R^2	0.798	0.331
Adjusted ICC	0.791	0.305
Firms controls	Yes	Yes
Sector fixed effects	Yes	Yes
Nation fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Firms random intercept	Yes	Yes

Notes: Models (1) and (2) are linear mixed-effects models reporting unstandardised coefficients (B); Models (3) and (4) are mixed-effects logistic models reporting odds ratios (ORs). All models include firm-level controls, sector, nation and year effects, and a firm random intercept. CI = confidence interval; ICC = intraclass correlation coefficient.
Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

The two primary models produced the same substantive conclusion. General business advice was positively but not significantly associated with continuous service export intensity, $B = 0.709$, 95% CI [−0.442, 1.860], $p = 0.228$. The estimated difference was therefore small, and the confidence interval was compatible with both a modest negative association and a modest positive association.

General business advice was also not significantly associated with the odds of high service export intensity, $OR = 1.107$, 95% CI [0.975, 1.256], $p = 0.117$. Although advice recipients had estimated odds approximately 10.7% higher than non-recipients, the confidence interval included one. The analysis therefore provides no statistically reliable evidence that general business advice was associated with either a higher percentage of turnover generated through service exports or a greater likelihood of belonging to the high-intensity category.

H1 was therefore not supported. Under both outcome definitions, general business advice was not significantly associated with higher service export intensity among service-only exporters after adjustment for firm size, business age, sector, UK nation and survey year and the inclusion of a firm-level random intercept. The high conditional $R^2$and adjusted ICC values, particularly in the continuous model, indicate substantial persistent variation between firms, but general advice did not explain a statistically significant share of that variation.

Supplementary models using export-specific advice or support produced the same substantive conclusion. Export-specific advice was not significantly associated with continuous service export intensity, $B = 0.348$, 95% CI [−4.466, 5.161], $p = 0.887$, or with high service export intensity, $OR = 1.040$, 95% CI [0.589, 1.838], $p = 0.892$. The comparatively wide confidence intervals indicate that these estimates were less precise than those for general business advice, particularly for the binary outcome.

The composite measure of any relevant advice produced estimates identical to general business advice and therefore did not provide independent evidence. The disaggregated analyses likewise identified no statistically significant association for any individual advice type. Trade-mission participation produced the largest positive estimates, $B = 16.051$, $p = 0.113$, and $OR = 2.487$, $p = 0.389$, but the estimates were imprecise and should be interpreted cautiously because relatively few firms reported this type of support.

The broader-sample and previous-observed-wave analyses did not alter the principal conclusion. Models including all SMEs reporting service exports produced substantively similar nonsignificant results, indicating that the findings were not driven by excluding firms that exported both products and services. Similarly, advice measured in the previous observed firm-wave was not significantly associated with subsequent service export intensity. Overall, the absence of statistically significant estimates across alternative advice measures, outcome definitions, analytical samples and temporal specifications provides consistent evidence that H1 was not supported. Full supplementary results are reported in Appendix Table 8.

5.2.2 External Finance and Service Export Intensity

Table 4 presents the primary tests of H2 among service-only exporters using two alternative measures of service export intensity. Contrary to the hypothesised direction, use of any external finance was associated with service export intensity that was 3.165 percentage points lower, $B = -3.165$, 95% CI [−4.557, −1.773], $p < 0.001$. After adjustment for observed firm characteristics and firm-level heterogeneity, finance users therefore reported lower continuous service export intensity than non-users.

The binary model produced the same substantive conclusion. Use of any external finance was associated with lower odds of high service export intensity, $OR = 0.711$, 95% CI [0.612, 0.826], $p < 0.001$, corresponding to approximately 28.9% lower odds.

Table 4: Primary models predicting service export intensity among service-only exporters

	Continuous service export intensity (1)	**High service export intensity** (2)
Finance measure	Any external finance	Any external finance
Finance effect	B=−3.165	OR=0.711
95% CI	[−4.557, −1.773]	[0.612, 0.826]
p-Value	<.001	<.001
Firm-year observations	5,996	6,424
Marginal R^2	0.034	0.039
Conditional R2	0.802	0.347
Adjusted ICC	0.795	0.32
Firm-level controls	Yes	Yes
Sector fixed effects	Yes	Yes
Nation fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Firm random intercept	Yes	Yes

Notes. Model (1) is a linear mixed-effects model reporting an unstandardised coefficient (B); Model (2) is a mixed-effects logistic model reporting an odds ratio (OR). Both models include firm-level controls, sector, nation and year effects, and a firm random intercept. CI = confidence interval; ICC = intraclass correlation coefficient. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

H2 was therefore not supported. Under both primary outcome definitions, external finance was significantly associated with lower, rather than higher, service export intensity. Supplementary models using debt or credit finance and non-debt or investment-support finance produced similar results for both outcomes, indicating that the negative contemporaneous association was not confined to a single broad category of finance. Nevertheless, the observational design and the possibility of reverse selection prevent a causal interpretation.

The instrument-specific models indicated heterogeneity across forms of finance. Overdrafts, leasing or hire purchase, and bank loans were negatively associated with continuous service export intensity. The binary models also identified negative associations for overdrafts, invoice finance, leasing or hire purchase, and bank loans. Equity finance was the principal exception and was positively associated with the odds of high service export intensity. These findings should be interpreted cautiously because 12 finance instruments were entered simultaneously, multiple comparisons were conducted, and some instruments were relatively uncommon.

The finance-by-year analysis provided limited evidence of temporal heterogeneity. The joint interaction was statistically significant for continuous service export intensity, $F(8, 3564.304) = 2.013$, $p = .041$, but not for the binary outcome, $F(8, 6385) = 0.769$, $p = .630$. Most year-specific contrasts were nonsignificant, providing no consistent evidence that the association changed systematically over the study period.

The previous-observed-wave analyses produced weaker and outcome-dependent evidence. Prior external finance was negatively but not significantly associated with subsequent continuous service export intensity among service-only exporters, $B = -1.215$, 95% CI [−3.044, 0.615], $p = .193$. However, prior finance use remained associated with lower odds of subsequent high service export intensity, $OR = 0.737$, 95% CI [0.596, 0.913], $p = .005$. The latter estimate corresponds to approximately 26.3% lower odds among prior finance users.

The broader-sample robustness models produced closely comparable contemporaneous results. Among all SMEs reporting service exports, any external finance was associated with lower continuous service export intensity, $B = -3.061$, 95% CI [−4.233, −1.890], $p < .001$, and lower odds of high service export intensity, $OR = 0.714$, 95% CI [0.626, 0.814], $p < .001$. These estimates were similar to the primary service-only results, $B = -3.165$and $OR = 0.711$, indicating that the main finding was not driven by excluding firms exporting both goods and services. Full grouped-finance, instrument-specific, finance-by-year, previous-observed-wave and broader-sample results are reported in Appendix Table 9.

> Advice was not associated with higher service export intensity, while external finance was associated with approximately 3.2 percentage points lower intensity among service-only exporters.

5.3 Obstacles for service exporters

5.3.1 Business Obstacles Among Service and Product Exporters

Table 5 presents the primary tests of H3. Consistent with the hypothesised direction, service-only exporters reported fewer business obstacles than product-only exporters. In the preferred binary specification, service-only exporters had significantly lower odds of reporting at least one major business obstacle, $OR = 0.786$, 95% CI [0.673, 0.917], $p = 0.002$. This corresponds to approximately 21.4% lower odds relative to product-only exporters, after adjustment for firm size, business age, nation and survey year.

The linear mixed-effects model for the obstacle-count outcome produced the same substantive conclusion. Service-only exporters reported significantly fewer business obstacles than product-only exporters, $B = -0.460$, 95% CI [−0.552, −0.368], $p < 0.001$. On average, this represents approximately 0.46 fewer reported obstacles after adjustment for firm size, business age, nation and survey year and accounting for repeated observations through a firm-level random intercept.

Table 5: Primary models predicting business obstacles among exporters

	Any business obstacle (1)	**Number of business obstacles** (2)
Model specification	Binary logistic regression	Linear mixed-effects model
Effect for service-only exporters	OR=0.786	B=−0.460
95% CI	[0.673, 0.917]	[−0.552, −0.368]
p-value	0.002	<.001
Firm-year observations	10,431	10,431
Marginal R^2	Not reported	0.086
Conditional R^2	Not applicable	0.530
Adjusted ICC	Not applicable	0.486
Firm-level controls	Yes	Yes
Nation fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Firm random intercept	No	Yes

Model 1 is a logistic regression reporting an odds ratio (OR), while Model 2 is a linear mixed-effects model reporting an unstandardised coefficient (B). Product-only exporters are the reference group. Both models control for firm size, business age, nation and year. Model 1 excludes a firm random intercept because its estimated variance was approximately zero. CI = confidence interval; ICC = intraclass correlation coefficient. Outcomes capture general business obstacles rather than export-specific barriers. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

The descriptive evidence followed the same pattern. Among firms with valid obstacle information, 90.5% of service-only exporters reported at least one major business obstacle, compared with 92.5% of product-only exporters. Firms exporting both goods and services reported the highest prevalence, at 93.6%. These descriptive differences are consistent with the adjusted results, although the high prevalence of the binary outcome should be considered when interpreting the estimates.

H3 was therefore supported. Across the preferred binary and count specifications, service-only exporters had lower odds of reporting at least one major business obstacle and reported fewer obstacles overall than product-only exporters. The findings concern general business obstacles rather than barriers specific to exporting and should be interpreted as adjusted associations rather than causal effects.

The individual-obstacle models indicated that the aggregate result reflected differences across several obstacles rather than a single dominant category. Service-only exporters were significantly less likely than product-only exporters to report obstacles related to obtaining finance, taxation, regulation or red tape, premises, competition, workplace pensions, Brexit, the National Living Wage, energy prices and other cost pressures. The main exception was late payment, which service-only exporters were more likely to report as an obstacle, $OR = 1.235$, 95% CI [1.125, 1.356], $p < .001$. No statistically significant differences were found for staff recruitment and skills or COVID-19-related obstacles. Because these models involved multiple comparisons and some obstacles were only measured in particular survey waves, the results should be interpreted as exploratory. Full estimates are reported in Appendix Table 10.

The previous-observed-wave models provided temporal robustness for the main findings. Firms that had not been service-only exporters in the previous observed wave had higher odds of reporting a current business obstacle than firms that had been service-only exporters, $OR = 1.459$,

95% CI [1.133, 1.880], $p = .003$. Expressed in the direction of previous service-only exporter status, this corresponds to an $OR$of approximately 0.685, or 31.5% lower odds of reporting a current obstacle. Previous service-only exporter status was also associated with fewer current business obstacles in the count model, $B = -0.608$, 95% CI [−0.753, −0.462], $p < .001$. These findings strengthen the temporal ordering of the evidence but do not establish causality. Full results are reported in Appendix Table 10.

5.3.2 Finance Use and Business Obstacles Among Service Exporters

Table 6 presents the primary tests of H4 among service-only exporters. Contrary to the hypothesised direction, external finance use was associated with greater reported obstacle exposure. In the logistic model, firms not using external finance had significantly lower odds of reporting at least one major business obstacle than finance users, $OR = 0.509$, 95% CI [0.390, 0.666], $p < 0.001$. Expressed in the direction of finance use, finance users had approximately 1.96 times the odds of reporting at least one major obstacle compared with non-users.

Table 6: Primary models predicting business obstacles among service-only exporters

	Any major business obstacle (1)	Number of major business obstacles (2)
Model specification	Logistic regression	Linear mixed-effects model
Effect of finance non-use	OR=0.509	B=−0.684
95% CI	[0.390, 0.666]	[−0.845, −0.523]
p-Value	<.001	<.001
Firm-year observations	2,644	2,644
Marginal pseudo-R^2	Not reported	0.055
Conditional pseudo-R^2	Not applicable	0.565
Adjusted ICC	Not applicable	0.539
Firm-level controls	Yes	Yes
Nation fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Firm random intercept	No	Yes

Notes. Model (1) is a logistic regression, while Model (2) is a linear mixed-effects model with a firm random intercept. Finance users are the reference group. Both models control for firm size, business age, nation and year. B = unstandardised coefficient; OR = odds ratio; CI = confidence interval; ICC = intraclass correlation coefficient. Outcomes capture general business obstacles rather than export-specific barriers. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

The linear mixed-effects model for the obstacle-count outcome produced the same substantive conclusion. Firms not using external finance reported 0.684 fewer obstacles than finance users, $B = -0.684$, 95% CI [−0.845, −0.523], $p < .001$. Equivalently, finance users reported approximately 0.68 additional obstacles relative to comparable non-users. The adjusted ICC of .539 indicates that persistent between-firm differences accounted for a substantial proportion of the variation in the number of obstacles reported.

H4 was therefore not supported. Across both primary outcomes, finance users were more likely to report at least one major business obstacle and reported a larger number of obstacles than non-users. These estimates represent adjusted associations and should not be interpreted as evidence that finance use causes additional obstacles. A plausible explanation is that firms experiencing greater financing needs, growth pressures or operational complexity are more likely to seek or use external finance.

The obstacle-specific analyses produced a broadly consistent pattern, with finance users more likely to report each of the obstacle categories examined. The strongest associations were observed for obtaining finance and other cost issues. However, these models used the broader sample of all service exporters rather than the primary service-only sample. They also involved multiple comparisons, and some obstacles were measured only in particular survey years. The

obstacle-specific results should therefore be treated as exploratory and are reported in Appendix Table 11A.

The previous-observed-wave analyses produced mixed evidence. Previous finance status was not significantly associated with whether a firm reported at least one current obstacle, $OR = 0.841$, 95% CI [0.603, 1.171], $p = .305$. By contrast, previous finance non-users reported 0.448 fewer current obstacles than previous finance users, $B = -0.448$, 95% CI [−0.631, −0.264], $p < .001$. Equivalently, firms using finance in the previous observed wave subsequently reported approximately 0.45 additional obstacles. The binary model should be interpreted cautiously because its global test was not significant and several estimates indicated unstable model estimation. These temporal results do not establish causality and are reported in Appendix Table 11A.

Finally, the broader-sample robustness analyses closely replicated the primary findings. Among all SMEs reporting service exports, including firms exporting both products and services, finance non-users had significantly lower odds of reporting at least one obstacle, $OR = 0.499$, 95% CI [0.395, 0.631], $p < .001$, and reported fewer obstacles overall, $B = -0.713$, 95% CI [−0.856, −0.571], $p < .001$. These estimates were similar to those obtained in the primary service-only sample, indicating that the findings were not driven by the exclusion of mixed product-and-service exporters. Full robustness results are reported in Appendix Table 11A.

5.3.3 Advice Receipt and Business Obstacles Among Service Exporters

Table 7 presents the primary tests of H5 among service-only exporters. Contrary to the hypothesised direction, receipt of advice or support was associated with greater reported obstacle exposure. In the logistic model, firms not receiving advice or support had significantly lower odds of reporting at least one major business obstacle than advice recipients, $OR = 0.628$, 95% CI [0.502, 0.784], $p < 0.001$. Expressed in the direction of advice receipt, recipients had approximately 1.59 times the odds of reporting at least one major obstacle compared with non-recipients.

Table 7: Primary models predicting business obstacles among service-only exporters

	Any major business obstacle (1)	**Number of major business obstacles** (2)
Model specification	Logistic regression	Linear mixed-effects model
Effect of no advice or support	OR=0.628	B=−0.293
95% CI	[0.502, 0.784]	[−0.405, −0.180]
p-Value	<.001	<.001
Firm-year observations	4,107	4,107
Marginal pseudo-R^2	Not reported	0.043
Conditional pseudo-R^2	Not applicable	0.557
Adjusted ICC	Not applicable	0.537
Firm-level controls	Yes	Yes
Nation fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Firm random intercept	No	Yes

Notes. Model (1) is a logistic regression, while Model (2) is a linear mixed-effects model with a firm random intercept. Advice recipients are the reference group. Both models control for firm size, business age, nation and year. B = unstandardised coefficient; OR = odds ratio; CI = confidence interval; ICC = intraclass correlation coefficient. Outcomes capture general business obstacles rather than export-specific barriers. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

The linear mixed-effects model for the number of reported obstacles produced the same substantive conclusion. Firms not receiving advice or support reported 0.293 fewer obstacles than advice recipients, $B = -0.293$, 95% CI [−0.405, −0.180], $p < .001$. Equivalently, advice recipients reported approximately 0.29 additional obstacles relative to comparable non-recipients. The adjusted ICC of .537 indicates that persistent between-firm differences accounted for a substantial proportion of the variation in the number of reported obstacles.

The descriptive results followed the same pattern. Within the primary sample, 41.9% of service-only exporters received advice or support and 90.9% reported at least one major business

obstacle. Obstacle reporting was more prevalent among advice recipients: 93.0% reported at least one obstacle, compared with 89.3% of non-recipients. These descriptive differences are consistent with the adjusted results but do not establish that advice receipt caused greater obstacle exposure.

H5 was therefore not supported. Across both primary outcomes, advice recipients were more likely to report at least one major business obstacle and reported a larger number of obstacles than non-recipients. These estimates represent adjusted associations and should not be interpreted as evidence that advice or support creates business obstacles. A plausible explanation is need-based selection, whereby firms facing more numerous or complex constraints are more likely to seek advice, receive support or be targeted by support programmes.

The individual-obstacle analyses indicated that the relationship between advice receipt and obstacle reporting was not uniform across all constraints. The strongest associations were concentrated in obstacles relating to finance, taxation, staff recruitment and skills, regulation, premises and Brexit. Because separate models were estimated for multiple obstacles and some items were available only in selected survey waves, these results should be regarded as supplementary and exploratory. Full estimates are reported in Appendix Table 11A.

The disaggregated-advice analyses also produced less consistent evidence than the broad advice measure. The general advice and composite advice measures provided the most stable results, whereas several specific forms of support were relatively uncommon and generated less precise estimates. In the service-only model for the number of obstacles, firms not receiving the advice category represented by Advice_K5E reported approximately 0.466 fewer obstacles, $B \approx -0.466$, $p = 0.028$, than recipients. However, this result should be treated as exploratory. Models involving Advice_K5T require particular caution because of the small number of positive cases and the resulting risk of quasi-complete separation. Full disaggregated results are reported in Appendix Table 11A.

The previous-observed-wave analyses produced mixed evidence. Previous advice receipt was not significantly associated with whether a firm reported at least one current obstacle. Firms not receiving advice in the previous observed wave had lower estimated odds of reporting a current obstacle, $OR = 0.699$, but the association did not reach the conventional significance threshold, $p = 0.077$. By contrast, firms not receiving advice in the previous observed wave reported 0.339 fewer current obstacles than previous advice recipients, $B = -0.339$, $SE = 0.096$, $p < 0.001$. Equivalently, previous advice recipients subsequently reported approximately 0.34 additional obstacles. These results provide limited evidence of temporal persistence but do not establish causality. Full previous-wave results are reported in Appendix Table 11A.

Finally, the broader-sample robustness analyses produced results similar to those obtained in the primary service-only sample. Among all service exporters, including firms exporting both products and services, non-recipients had lower odds of reporting at least one major obstacle, $OR = 0.576$, $p < 0.001$, and reported fewer obstacles overall, $B = -0.305$, $p < 0.001$. These estimates were comparable to the primary service-only estimates of $OR = 0.628$and $B = -0.293$, indicating that the principal findings were not driven by the exclusion of mixed product-and-service exporters. Full broader-sample results are reported in Appendix Table 11A.

> Service-only exporters reported fewer obstacles than product-only exporters, but those using external finance or receiving advice reported greater obstacle exposure. This suggests that finance and support are often used by firms facing more complex needs, rather than immediately reducing reported constraints.

5.4 Exploratory Causal map

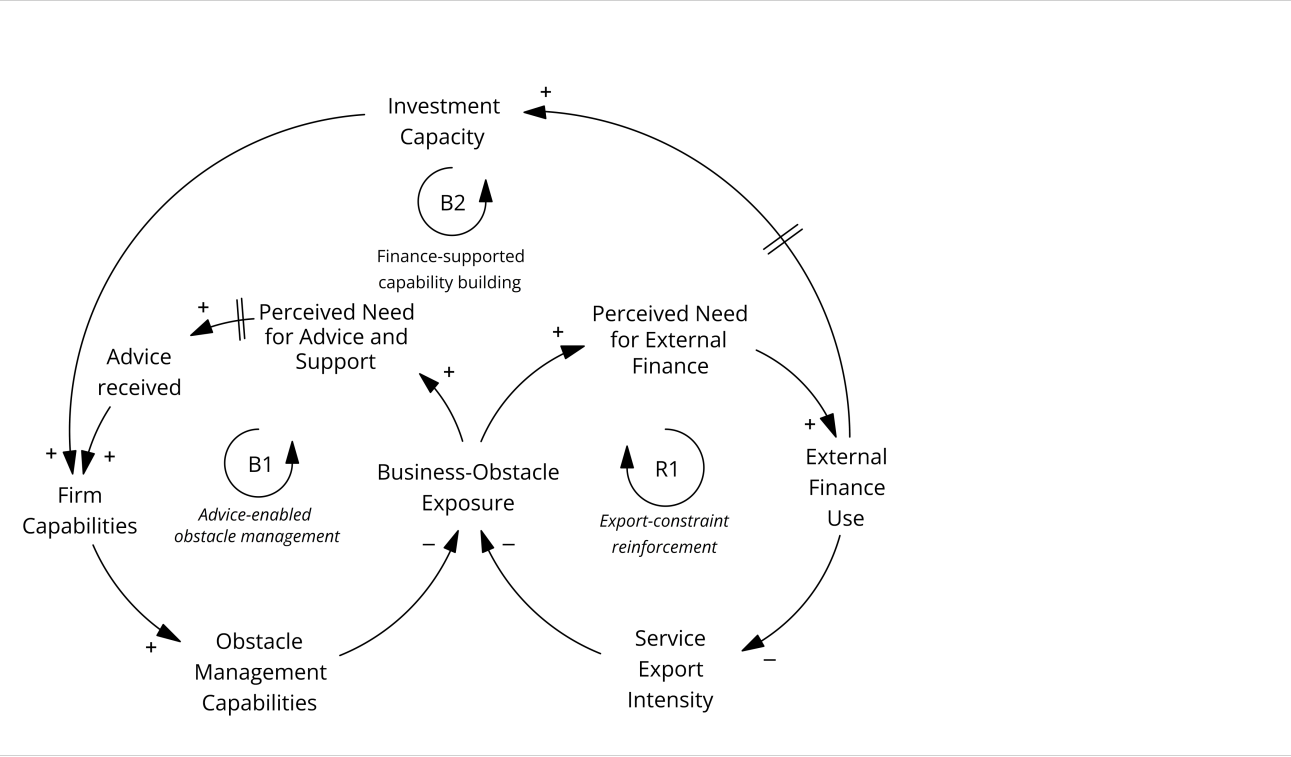
The causal map provides an exploratory synthesis of the study's findings. Its relationships are derived from the statistically significant associations identified through the hypothesis tests and

from theoretically plausible mechanisms supported by the literature. Because the analysis is observational and several intermediate constructs were not directly measured, the feedback loops should be interpreted as provisional system-level hypotheses requiring further empirical and dynamic validation, rather than as established causal mechanisms.

The advice-enabled obstacle management balancing loop (B1) shows how firms may respond to business constraints through external support. As reported business-obstacle burden increases, the perceived need for advice and support rises, increasing the receipt of advice. Advice can strengthen firm capabilities, which improve firms' capacity to manage obstacles (Leonidou et al., 2011; Catanzaro & Teyssier, 2021). More effective obstacle management subsequently reduces reported business-obstacle burden relative to what it would otherwise have been closing the balancing loop, B1. The finance-supported capability building balancing loop (B2) represents a parallel response through external finance. As reported business-obstacle burden increases, firms' perceived need for external finance rises, encouraging greater use of external funding. External finance increases firms' capacity to invest, although a time delay may occur before funding is converted into organisational capabilities. Stronger firm capabilities improve obstacle-management capacity, reducing the reported business-obstacle burden relative to what it would otherwise be. The loop is balancing because access to finance and subsequent capability development counteract the constraints that initially increased financing needs.

The constraint-driven finance and export-intensity cycle reinforcing loop (R1) illustrates a potential process through which business constraints may persist. As reported business-obstacle burden increases, firms' perceived need for external finance rises, leading to greater external finance use. The empirical findings show that finance use is associated with lower service export intensity. Lower service export intensity is then theorised to increase firms' exposure to business constraints, reinforcing the initial obstacle burden and generating further financing needs. These relationships form a reinforcing loop because the initial increase in obstacles is amplified with each cycle around the loop.

Figure 3: Causal map of feedback mechanisms shaping service-exporting SMEs.



Positive links indicate that variables move in the same direction, while negative links indicate movement in opposite directions. B and R denote balancing and reinforcing loops, respectively; double lines indicate a time delay. Source: authors' analysis.

Key Insight

Service-only exporters reported fewer business obstacles than product-only exporters, yet neither business advice nor external finance was associated with higher service export intensity. Firms using finance or receiving advice reported more obstacles, suggesting that support is often directed towards businesses with greater or more complex needs. The causal map further indicates that advice and finance may operate indirectly by strengthening firms' capabilities to manage obstacles, although delays and reinforcing pressures may prevent these benefits from producing immediate improvements in export performance.

6. Conclusions and Recommendations

The findings identify service-exporting SMEs as a distinctive segment of the UK exporting population. Between 2015 and 2024, the overall proportion of exporting SMEs remained relatively stable, but the share reporting service exports declined while product exporting increased modestly. SMEs reporting service exports were generally smaller, concentrated in knowledge-intensive sectors, and active primarily in markets such as the European Union, the United States, and Canada. Women-led businesses were also well represented among service exporters, reflecting their greater concentration in service-oriented and knowledge-intensive sectors and lower representation in manufacturing and goods-producing industries. It was also found evidence of a gradual increase in ethnic minority participation in exporting over time.

These characteristics create opportunities for implementing policy instruments to promote digital delivery, knowledge and intangible assets, but may also expose firms to limited organisational capacity, specialist skills requirements and regulatory complexity (Wagner, 2002; Savic et al., 2020). The divergence between service and product exporting coincided with Brexit and the COVID-19 pandemic, although the descriptive evidence cannot establish causality (Ando and Hayakawa, 2022; Du and Shepotylo, 2022; Du et al., 2025). Policy support should consequently recognise the distinctive needs of service exporters, particularly microbusinesses, by providing accessible assistance with digital delivery, professional regulation, intellectual property, international contracting and overseas market development.

Previous research argues that advanced economies increasingly specialise in knowledge-intensive business services because these activities rely on highly skilled labour, innovation capabilities, and intangible assets that generate competitive advantages in international markets (Savic et al., 2020). The strong export orientation of Professional, Scientific and Technical Activities, and Information and Communication services observed in the data reflects the UK's comparative advantage in sectors characterised by high human capital, knowledge creation, and innovation networks (CIIP, 2026). At the same time, manufacturing remains the dominant source of product exports because goods trade continues to depend on established industrial capabilities, global value-chain integration, and economies of scale, particularly in export-oriented activities of high-value manufacturing sectors (Anil et al., 2025).

H1 was not supported. Neither general nor export-specific advice was significantly associated with service export intensity, and this conclusion remained consistent across the alternative outcomes and supplementary analyses. These results do not necessarily indicate that advice is ineffective. Support may improve market knowledge, regulatory preparedness, export capabilities and international relationships without immediately increasing the proportion of turnover generated through service exports (Comi and Resmini, 2019; Mota et al., 2021). This may be particularly relevant to service firms, whose internationalisation often depends on specialised knowledge, reputation and relational assets that take time to develop (Lovelock and Gummesson, 2004; Pla-Barber and Ghauri, 2012; Brandl et al., 2025). Therefore, advice programmes should be focused on promoting export readiness, capability development, market entry, and export persistence, rather than immediate changes in export intensity alone. Support programmes should differentiate between generic business support and targeted export assistance, ensuring that services are aligned with firms' evolving needs as they progress through different stages of internationalisation.

H2 was also not supported in its hypothesised direction. External finance was associated with lower service export intensity, although the previous-observed-wave evidence was weaker and less consistent. This should not be interpreted as evidence that finance reduces export performance. Finance use may instead reflect liquidity pressures, working-capital requirements or investment needs among firms already facing difficult operating conditions. The variation across instruments reinforces this interpretation: overdrafts, bank loans and leasing may address short-term financial or asset needs, whereas equity may be more closely associated with innovative and growth-oriented firms (Han and Gu, 2021). Exporters may also use finance to manage cash flow or mitigate risk rather than directly increase export turnover (British Business Bank, 2020). Policy should therefore

focus not only on the availability of finance but also on its type, timing and purpose. Instruments such as equity, guarantees, and innovation finance may be better aligned with investments in knowledge, software, professional capabilities and overseas relationships, although the exploratory equity result does not establish a causal effect.

H3 was supported. Service-only exporters reported fewer obstacles overall than product-only exporters, possibly because some services are less dependent on physical production, inventory, transportation, warehousing and border processes (Francois and Hoekman, 2010). However, the outcomes measured general business obstacles rather than export-specific barriers, and the pattern was not uniform. Late payment was the main exception, suggesting that service exporters remain exposed to cash-flow pressures when professional or project-based work is delivered before payment is received (British Business Bank, 2020; Kaya, 2024). Support for service exporters should therefore include contract-management guidance, payment-risk assessment, client due diligence and access to appropriate working-capital facilities. The use of deposits, staged payments, digital invoicing and effective dispute-resolution procedures may also help firms manage delayed payments without taking on unsuitable debt.

H4 and H5 were not supported. Service-only exporters using external finance or receiving advice reported greater obstacle exposure than their respective comparison groups. A common explanation is need-based selection: firms facing more numerous or complex constraints may be more likely to seek finance, request advice or be targeted by support programmes. Furthermore, internal organisational obstacles can constrain firms' ability to leverage trade finance effectively. In particular, deficiencies in financial management, limited creditworthiness, and underdeveloped business plans reduce the likelihood that firms can benefit from the trade finance required for international expansion (Jayaweera et al., 2026).

Finance and advice may therefore represent responses to existing obstacles rather than their causes. Advice may strengthen firms’ capacity to manage constraints without immediately reducing the number reported, while the benefits of finance may depend on financial management, credit readiness and wider organisational capabilities (Leonidou, 1995; Leonidou et al., 2011; Catanzaro and Teyssier, 2020). Programme evaluations should consequently account for firms’ initial needs and examine changes in obstacle severity, capability and performance over time. Simple comparisons between recipients and non-recipients may understate programme effectiveness if support is appropriately targeted towards firms facing greater constraints.
Taken together, the findings support an integrated rather than fragmented policy approach. Advice and finance should not be treated as standalone mechanisms for increasing service exports or removing business obstacles. Support providers should diagnose firms’ combined financial, managerial, regulatory, digital and workforce needs and link them to an appropriate package of assistance. This may include export-specific advice, suitable finance, professional-regulation guidance, digital capability development and international networking.

Previous research suggests that combinations of export-support instruments and repeated assistance can be more effective than isolated interventions (Volpe Martincus and Carballo, 2010; Broocks and Van Biesebroeck, 2017). Programme design should also reflect firms’ stages of internationalisation. New and less experienced exporters may require foundational market information, training and support in identifying overseas opportunities, whereas more established firms may benefit from assistance with scaling, market diversification, reputation building and international networks (Marin-Cadavid & Garcia, 2016). Policy monitoring should record the type, intensity, timing and purpose of both advice and finance, together with firms’ starting conditions. This would make it possible to assess whether assistance improves capabilities and intermediate outcomes before generating measurable changes in export intensity.

The exploratory causal map shows how these interventions may operate through feedback. Its balancing loops suggest that obstacles increase the need for advice and finance, which may strengthen firms’ capabilities and improve obstacle management over time (Leonidou et al., 2011; Catanzaro and Teyssier, 2020). However, delays in converting support into capabilities may explain why advice and finance do not produce immediate improvements in export intensity or reported

obstacles. The map also identifies potential unintended consequences. Finance may relieve immediate liquidity pressures without improving export capacity if firms lack the capabilities to deploy it effectively. Similarly, advice may strengthen knowledge and preparedness but have limited effects when firms lack the resources required to act on it. External finance could form part of a reinforcing cycle in which firms facing persistent obstacles continue to rely on funding while service export intensity remains constrained. This mechanism is consistent with evidence that internal weaknesses can limit the benefits of trade finance (Jayaweera et al., 2026). Policy should therefore combine finance and advice, tailor support to firms' stages of internationalisation and allow sufficient time for capability development. Evaluation should distinguish immediate programme outputs from longer-term outcomes such as export readiness, obstacle management, market entry and export persistence. It should also consider firms' starting conditions, since support recipients may initially face greater constraints than non-recipients.

Overall, service-exporting SMEs should not be treated simply as smaller versions of goods exporters. Their internationalisation depends on knowledge, relationships, intangible assets and organisational capabilities, as well as appropriately designed financial and advisory support. The findings and exploratory causal map therefore support coordinated packages of export-specific advice, appropriate finance and capability development, tailored to firms' size, sector, target market, obstacle profile and stage of internationalisation. Such interventions should account for firms' initial needs, implementation delays, policy trade-offs and potential unintended consequences rather than being evaluated in isolation. Because the proposed feedback mechanisms combine adjusted statistical associations with theoretically grounded relationships, further longitudinal and dynamic validation is required to determine which combinations and sequences of support produce sustained improvements in service-exporting outcomes (Volpe Martincus and Carballo, 2010; Broocks and Van Biesebroeck, 2017).

6.1 Summary of Key Findings

Overall Conclusion

Service-exporting SMEs should not be treated simply as smaller versions of goods exporters. Their internationalisation depends on a distinctive combination of knowledge, relationships, intangible assets and organisational capabilities. The findings and exploratory causal map therefore support coordinated, service-specific assistance combining appropriate finance, specialised advice, regulatory guidance and capability development. Such support should recognise that recipients may initially face greater needs and constraints, and that delays, trade-offs and reinforcing pressures may limit immediate improvements in export performance.

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Appendices

Appendix A: Model variables

Created construct	Abbreviated variable name(s)	Categories or measurement
Panel and time identifiers	id_original; year_index or wave_index; years	id_original: original row number before restructuring; wave index: 1 to 10; calendar year: 2015 to 2024
Long-format variables	Variables ending in _long	Annual wide-format variables were combined into a single variable for each construct, with one observation per business and survey year. Examples include C1_long, C2_long, A2_long, A6SUM_long, SIC1DIG_long, NATION_long, GOR_long, WLED_long, MLED_long, P1_long and G2A_long to G2M_long.
Service-exporter indicator	ServiceExporter	1 = exports services; 0 = does not export services. Derived from C1_long. Missing, refused and inapplicable responses remain separate from “No”.
Product-exporter indicator	ProductExporter	1 = exports goods or products; 0 = does not export goods or products. Derived from C2_long.
Any-exporter indicator	AnyExporter	1 = exports services, products, or both; 0 = exports neither. Derived from ServiceExporter and ProductExporter.
Exporter type	ExporterType	0 = non-exporter; 1 = product-only exporter; 2 = service-only exporter; 3 = exports both services and products
Exporter-type indicators	ServiceOnlyExporter; ProductOnlyExporter; BothExporter	Separate binary indicators: 1 = belongs to the specified exporter category; 0 = belongs to another category
Exporter comparison group	exporter_group	1 = C1 Yes; 2 = C1 No; 3 = C2 Yes; 4 = C2 No
Continuous service export intensity	ServiceExportIntensity; C1A_long	Percentage of turnover generated by service exports, ranging theoretically from 0% to 100%. Analyses are restricted to observations reporting service exports.
High service export intensity	High_ServiceExportIntensityB	0 = low or medium service export intensity, corresponding to C1B categories 1 to 3; 1 = high service export intensity, corresponding to categories 4 to 7
General business advice	GeneralAdvice_K2; Advice_K2	1 = used or received general business advice or information; 0 = did not use or receive it
Export-specific advice and support	ExportSpecificAdvice; ExportAdvice_K5D; Advice_K5D; TradeMission_K5T; Advice_K5T	Separate or combined indicators for exporting advice and trade-mission participation. 1 = received or participated; 0 = did not receive or participate
Any relevant advice	AnyRelevantAdvice; AdviceAny; Advice_K5	1 = received at least one included form of advice or support; 0 = received none. The precise component items differ slightly between the O2 and O3 specifications.

Created construct	Abbreviated variable name(s)	Categories or measurement
Any external finance	FinAny	1 = currently uses at least one included type of external finance; 0 = uses none of the included types
Debt or credit finance	FinDebt	1 = uses at least one included debt-like or credit-based instrument; 0 = uses none
Non-debt or investment-support finance	FinNonDebt	1 = uses at least one included non-debt or investment-support instrument; 0 = uses none
Individual external-finance indicators	Finance-type binary variables derived from relevant H3 items	1 = uses the finance type; 0 = does not use it. Types include bank overdrafts, commercial mortgages, credit cards, bank loans, leasing or hire purchase, invoice finance, equity finance, grants, peer-to-peer finance, family or friend loans, partner/director/owner finance, and other finance.
Any major business obstacle	AnyBusinessObstacle; AnyObstacle_S	1 = at least one valid G2 obstacle selected; 0 = no available obstacle selected. Missing when the G2 block is unavailable or contains no valid response.
Business-obstacle count	BusinessObstacleCount	Count of the valid G2 obstacle indicators selected in the relevant firm-year. Components include finance, taxation, recruitment and skills, regulation, premises, competition, pensions, late payment, Brexit[a], National Living Wage[a], COVID-19[e], energy prices[g] and other cost issues[g].
Individual business-obstacle indicators	BO_Finance; BO_Taxation; BO_Skills; BO_Regulation; BO_Premises; BO_Competition; BO_Pensions; BO_LatePayment; BO_Brexit; BO_NLW; BO_Covid; BO_Energy; BO_OtherCosts	Each is coded 1 when the corresponding G2 item is selected and 0 when it is not selected among valid respondents. Brexit[a]; National Living Wage[a]; COVID-19[e]; energy prices[g]; other cost issues[g].
Long-format export destinations	C2CA_long to C2CJ_long	Separate selected/not-selected indicators: European Union[a]; broad non-EU countries[a]; United States[c]; EFTA[c]; Canada[c]; Turkey[c]; South Korea[c]; China[c]; India[c]; other international destinations[c]; Republic of Ireland[h]
Number of export destinations	ExportDestinationCount	Number of valid destination categories selected in a firm-year
Any destination identified	AnyExportDestination	1 = at least one destination selected; 0 = no destination selected among valid destination responses
Multiple export destinations	MultipleExportDestinations	1 = two or more valid destination categories selected; 0 = zero or one destination selected
Export destination scope	ExportDestinationScope	0 = no destination selected among valid responses; 1 = single destination; 2 = multiple destinations
Lagged advice measures	Lag_AdviceAny and lagged advice-type variables	Previous value of advice or support for the same business after observations are ordered by SERIAL and year. 0 = no prior advice; 1 = prior advice
Lagged finance measures	Lag_FinAny; Lag_FinDebt; Lag_FinNonDebt; lagged finance-type indicators	Previous value of any finance, grouped finance or individual finance type for the same business. 0 = no prior finance; 1 = prior finance

Created construct	Abbreviated variable name(s)	Categories or measurement
Lagged obstacle measures	Lag_AnyObstacle_S; Lag_BusinessObstacleCount; lagged individual obstacle indicators	Previous any-obstacle status, obstacle count or specific obstacle for the same business
Lagged control variables	Lag_A2_long; Lag_A6SUM_long; Lag_SIC1DIG_long; Lag_NATION_long	Previous observed values of employment size, business age, sector and nation for the same firm
Theoretical capability variables used in the CLD	Investment capacity; firm capability; obstacle management; need for finance; need for support; resource needs	Conceptual variables inferred from the empirical findings and relevant theory. They are not direct LSBS measures created in the statistical dataset.

Appendix B: Supplementary advice models predicting service export intensity among service-only exporters

Table 8A. Supplementary advice models predicting service export intensity among service-only exporters

	Continuous service export intensity		High service export intensity	
	(1)	(2)	(3)	(4)
Advice measure	Export-specific advice or support	Any relevant advice	Export-specific advice or support	Any relevant advice
Advice effect	B=0.348	B=0.709	OR=1.040	OR=1.107
95% CI	[−4.466, 5.161]	[−0.442, 1.860]	[0.589, 1.838]	[0.975, 1.256]
p-Value	0.887	0.228	0.892	0.117
Firm-year observations	6,453	7,222	6,907	7,730
Marginal R^2	0.036	0.035	0.038	0.037
Conditional R^2	0.796	0.798	0.326	0.331
Adjusted ICC	0.789	0.791	0.299	0.305
Firm-level controls	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes
Nation fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm random intercept	Yes	Yes	Yes	Yes

Note. Models (1) and (2) are linear mixed-effects models reporting unstandardised coefficients (B); Models (3) and (4) are mixed-effects logistic models reporting odds ratios (ORs). All models include firm-level controls, sector, nation and year effects, and a firm random intercept. CI = confidence interval; ICC = intraclass correlation coefficient. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

Appendix C: Supplementary grouped-finance models among service-only exporters

Table 9A. Supplementary grouped-finance models among service-only exporters

	Continuous service export intensity		High service export intensity	
	(1)	(2)	(3)	(4)
Finance measure	Debt or credit finance	Non-debt or investment-support finance	Debt or credit finance	Non-debt or investment-support finance
Finance effect	B=−3.164	B=−3.324	OR=0.722	OR=0.741
95% CI	[−4.543, −1.786]	[−4.744, −1.904]	[0.624, 0.835]	[0.634, 0.866]
p-Value	<.001	<.001	<.001	<.001

Firm-year observations	5,996	5,996	6,424	6,424
Marginal R^2	0.034	0.035	0.039	0.038
Conditional R^2	0.802	0.803	0.347	0.347
Adjusted ICC	0.795	0.796	0.32	0.321
Firm-level controls	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes
Nation fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm random intercept	Yes	Yes	Yes	Yes

Note. Models (1) and (2) are linear mixed-effects models reporting unstandardised coefficients (***B***); Models (3) and (4) are mixed-effects logistic models reporting odds ratios (ORs). All models include firm-level controls, sector, nation and year effects, and a firm random intercept. CI = confidence interval; ICC = intraclass correlation coefficient. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

Appendix D: Supplementary grouped-finance models among service-only exporters

Table 10A. Supplementary grouped-finance models among service-only exporters

	Any major business obstacle (1)	**Any major business obstacle** (2)	**Any major business obstacle** (3)	**Number of major business obstacles** (4)
Model specification	Mixed-effects logistic	Mixed-effects logistic	Previous-observed-wave logistic	Previous-observed-wave linear mixed-effects
Exporter groups	Product-only and service-only	Product-only, service-only and mixed	Previous exporter type	Previous exporter type
Effect for service-only exporters	OR=0.823	OR=0.819	OR=0.685	B=−0.608
95% CI	Not reported	Not reported	[0.532, 0.883]	[−0.753, −0.462]
p-Value	0	0	0	<.001
Marginal R^2	Not reported	Not reported	Not reported	0.079
Conditional R^2	Not reported	Not reported	Not applicable	0.524
Adjusted ICC	Approximately zero	Approximately zero	Not applicable	0.483
Firm-level controls	Yes	Yes	Yes	Yes
Nation fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm random intercept	Yes	Yes	No	Yes
Estimation warning	Hessian warning	Hessian warning	None reported	None reported

Note. Product-only exporters are the reference group in Models (1) and (2), which are diagnostic because of negligible random-intercept variance and Hessian warnings. Model (3) reports the inverted OR for previous service-only exporter status, while Model (4) reports its adjusted association with the current number of obstacles. All models control for firm size, business age, nation and year. OR = odds ratio; B= unstandardised coefficient; CI = confidence interval; ICC = intraclass correlation coefficient. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

Appendix E: Supplementary and robustness analyses of finance use and reported business obstacles

Table 11A. Supplementary and robustness analyses of finance use and reported business obstacles

Analysis	Outcome or obstacle	Effect of finance non-use	95% CI	p	Firm-year observations
Individual-obstacle model	Obtaining finance	OR = 0.275	Not reported	<.001	3,778
Individual-obstacle model	Taxation	OR = 0.681	Not reported	<.001	3,778
Individual-obstacle model	Staff recruitment and skills	OR = 0.614	Not reported	0.047	3,778
Individual-obstacle model	Regulation or red tape	OR = 0.703	Not reported	<.001	3,778
Individual-obstacle model	Premises availability or cost	OR = 0.644	Not reported	<.001	3,778
Individual-obstacle model	Competition	OR = 0.750	Not reported	<.001	3,778
Individual-obstacle model	Workplace pensions	OR = 0.685	Not reported	0.005	3,778
Individual-obstacle model	Late payment	OR = 0.587	Not reported	<.001	3,778
Individual-obstacle model	Brexit-related challenges	OR = 0.778	Not reported	0.001	3,778
Individual-obstacle model	National Living Wage	OR = 0.705	Not reported	0.016	3,778
Individual-obstacle model	COVID-19	OR = 0.581	Not reported	0.001	Varies by wave
Individual-obstacle model	Energy prices	OR = 0.728	Not reported	0.044	Varies by wave
Individual-obstacle model	Other cost pressures	OR = 0.449	Not reported	<.001	Varies by wave
Previous-observed-wave model	Any major business obstacle	OR = 0.841	[0.603, 1.171]	0.305	2,169
Previous-observed-wave model	Number of major business obstacles	B = −0.448	[−0.631, −0.264]	<.001	2,169
Broader-sample robustness model	Any major business obstacle	OR = 0.499	[0.395, 0.631]	<.001	3,778
Broader-sample robustness model	Number of major business obstacles	B = −0.713	[−0.856, −0.571]	<.001	3,778

Note. Individual-obstacle and robustness models include all service exporters. Previous-wave models relate prior finance use to current obstacles. All models control for firm size, business age, nation and year; obstacle-count models include a firm random intercept. Individual-obstacle results are exploratory. B= unstandardised coefficient; OR = odds ratio; CI = confidence interval. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

Appendix F: Supplementary and robustness analyses of advice receipt and reported business obstacles

Table 12A. Supplementary and robustness analyses of advice receipt and reported business obstacles

Analysis	Sample	Outcome or advice measure	Effect of no advice or support	95% CI	p
Disaggregated-advice model	Service-only exporters	Number of obstacles, K5E advice	B=−0.466	Not reported	0
Previous-observed-wave model	Service-only exporters	Any major business obstacle	OR=0.699	Not reported	0
Previous-observed-wave model	Service-only exporters	Number of major business obstacles	B=−0.339	Not reported	<.001
Broader-sample robustness model	All service exporters	Any major business obstacle	OR=0.576	Not reported	<.001
Broader-sample robustness model	All service exporters	Number of major business obstacles	B=−0.305	Not reported	<.001

Note. Previous-wave models relate earlier advice to current obstacles; broader-sample models include all service exporters. All models control for firm size, business age, nation and year. Disaggregated results are exploratory. B= unstandardised coefficient; OR = odds ratio; CI = confidence interval. Source: Longitudinal Small Business Survey, 2015–2024; authors' analysis.

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