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*By Ross Brown, Jose Liñares Zegarra,
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The Impact of Brexit on the Future Strategic Intentions of UK SMEs

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Abstract

The UK vote to leave the European Union (Brexit) in June 2016, was an unparalleled political event with potentially seismic consequences for the economy. Using data from a UK government survey of approximately 10,000 SMEs, this paper investigates which SMEs are most concerned by Brexit and the likely impact of this event on their (self-reported) strategic future intentions related to accessing finance, growth, innovation and capital expenditure. The results of a descriptive analysis suggest that larger, innovative, export-oriented SMEs and those operating in business services perceive Brexit as a major obstacle to the success of their business. The results of a regression based analysis suggest Brexit could potentially result in weaker growth, lower levels of innovation, reduced capital investment and lower access to external finance, especially for innovative and export-oriented SMEs. Importantly, Brexit may have the most significant negative repercussions for the SMEs often viewed as the largest contributors to long-term productivity growth.

Key Words

Brexit, SMEs, Uncertainty, Entrepreneurship, Investment, Public Policy.

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1. Introduction

In response to calls for deeper academic engagement around major *unforeseen events* affecting institutional regimes and associated firm practices (Wood and Budhwar, 2016), this paper examines the potential impact of Brexit on UK small and medium-sized enterprises (SMEs). The June 2016 referendum vote to leave the European Union (EU) and subsequent triggering of Article 50 has increased business uncertainty in the UK (Bloom et al, 2017).¹ Owing to its highly complex, contested and indeterminate nature (Jessop, 2017), Brexit has the potential to dramatically change the rules governing how UK firms conduct business both domestically and internationally. While some commentators predict Brexit could have *dire consequences* for entrepreneurship and the small business sector in the UK (Cumming and Zahra, 2016; p. 690), to date corroborating empirical evidence has been limited.

Researchers from a wide range of disciplines including economics, entrepreneurship, corporate finance, organisation theory and strategic management have all examined the fundamental role of uncertainty in shaping the decision-making processes of firms (Duncan, 1972; Milliken, 1987; McMullen and Shepherd, 2006; Diebold et al, 2010; Chari et al, 2014; Baker et al, 2016).² Prior evidence suggests that SMEs may be disproportionately impacted by uncertainty given their lower resilience to unexpected shocks (Ghosal and Loungani 2000; Storey and Sykes, 2010; Ghosal and Ye, 2015; Morikawa, 2016). Moreover, the impact of uncertainty is likely to vary across SMEs of different size, strategic orientation, governance structure and geographic location. As a consequence, an investigation of the types of SMEs likely to be affected by Brexit, and how this is likely to affect future strategic intentions is a highly relevant exercise from both a managerial and policy perspective.

According to North (1990) institutions exist due to the uncertainties involved in human interaction, and the institutional environment determines the formal and informal *rules of the game*. As such the institutional environment is crucial for mediating entrepreneurial activity and firm-level strategic behaviour (Rodrik, 1991; Minniti, 2008; Autio and Fu, 2015). Owing to its highly politicised

and negotiated nature, Brexit is likely to have major ramifications for entrepreneurial action and how UK firms do business both domestically and internationally (Balls et al, 2018). Moreover, prior evidence (which focuses for the most part on large publicly traded firms) suggests that unforeseen events (such as the global financial crisis and the vote to leave the EU) increase uncertainty, which in turn leads to reductions (and delays) in tangible and intangible investments (Bloom et al, 2007; Bloom, 2009; Julio and Yook, 2012; Ghosal and Ye, 2015; Lee et al, 2015; Berg et al, 2016).

To the best of our knowledge, this is the first study to examine empirically the potential impact of Brexit on UK SMEs. We investigate which SMEs are most concerned by Brexit, and also assess the likely impact of this on the (self-reported) future strategic intentions of SMEs. In order to do so we utilise the Longitudinal Small Business Survey (LSBS) compiled by the UK Department for Business Energy and Industrial Strategy (BEIS). The LSBS is one of the largest attitudinal surveys of SMEs undertaken in the UK, sampling approximately 10,000 firms. In the immediate aftermath of the referendum result in June 2016, a number of specific questions were added to the LSBS in order to gauge the nature and potential economic impact of Brexit on SMEs. This included specific questions asking whether the UK exit from the EU is perceived by entrepreneurs and/or small business managers as a major obstacle to future business success.

We conduct our analysis in two stages. In the first stage, we conduct a preliminary descriptive analysis in order to understand which SMEs are most concerned by Brexit.³ Then, in the second stage, we execute a regression-based analysis to assess the likely impact of Brexit on the future strategic intentions of SMEs with respect to access to finance, growth, exports and investments. Such an analysis presents us with significant challenges given that certain characteristics may explain both the future strategic intentions of SMEs as well as whether SMEs perceive Brexit as a significant obstacle. We address this (potential source of endogeneity) by estimating (simultaneously via a recursive bivariate probit model) the relationship between the subjective views of SMEs regarding whether Brexit is a likely obstacle, and the self-reported future strategic intentions of SMEs.

The results of our preliminary descriptive analysis suggest that larger, innovative, export-oriented SMEs and those operating in business services industries perceive Brexit as a major obstacle to the success of their business. The results of the regression analysis suggest that Brexit is likely to impact on the future strategic intentions of SMEs via lower levels of capital investment, reduced access to external finance, lower levels of growth and innovation. Overall, the results of this study provide important and novel evidence regarding the potential consequences of Brexit for UK SMEs. As well as augmenting and complementing the growing literature on the effects of uncertainty on entrepreneurial action (McKelvie et al, 2011; Bylund and McCaffrey, 2017), the results of this study have strong relevance for entrepreneurs, policymakers, finance providers and industry associations.

The remainder of the paper is structured as follows. Section 2 examines the institutional background and provides a selective review of the evidence on the likely effects of Brexit on UK firms. In section 3, we describe the data sources and empirical methods. Section 4 presents the results of our preliminary descriptive and regression based analyses. In section 5, we provide reflections on the results. Section 6 concludes.

2. Contextual Background

Since the early 1970s the institutions, regulatory frameworks and the cumulative body of EU laws (the so-called *acquis communautaire*) established the so-called *rules of the game* for firms undertaking economic transactions within the EU (Grabbe, 2002). The June 2016 referendum vote to leave the EU and subsequent triggering of Article 50 led to increased uncertainty regarding post-Brexit regulation, immigration policy and trading arrangements between the UK and the rest of the EU (Coulter and Hancké, 2016). Brexit entails a particularly potent, legally complex and highly unpredictable set of outcomes, in part due to a lack of pre-planning for such an eventuality by the incumbent UK government (Barnard, 2017). Consequently, Brexit is such a polyvalent concept its exact meaning and implications are unclear (Jessop, 2017).⁴

To date, much of the analysis of the potential impact of Brexit has centred on the expected macroeconomic effects on future growth, trade and inflation (Armstrong and Portes, 2016; OECD, 2016; Van Reenen, 2016; Born et al, 2017; Dhingra et al, 2017a; Sampson, 2017).⁵ Evidence at firm and industry level focuses on how large firms are likely to be affected by Brexit (Dhingra et al, 2017b). Sectors of the UK economy such as automotive manufacturing (dominated by large foreign firms with complex cross-country supply chains) have experienced a 75% decline in fixed capital investment the past two years, with much of the decline attributed to Brexit related uncertainty (Financial Times, 2017a). Faced with uncertainty, some multinationals have become concerned regarding the overall attractiveness of the UK as a business location (Cumming and Zahra, 2016). For example, a BMW spokesman declared that *uncertainty is not helpful when it comes to making long-term business decisions* (Financial Times, 2017b).

While such evidence provides valuable insights for large firms and policy makers monitoring the effects of Brexit, it fails to provide the necessary information to assess the likely impact of Brexit on SMEs. Often considered the backbone of the modern economy, the 5.5 million SMEs in the UK account for over 99% of firms, and 60% of total UK private sector employment (European Commission, 2016).⁶ SMEs account for 73% of all net private sector job creation in the UK, with two million jobs created since 2010 (Nesta, 2017). Despite their crucial economic importance, most SMEs are often controlled by resource-constrained entrepreneurs and managers with limited contingency planning or foresight capabilities (Brown and Eisenhardt, 1998), making it difficult for such firms to deal with heightened levels of uncertainty (Gupta et al, 2004).

Owing to a paucity of data, empirical evidence regarding the potential impact of Brexit on UK SMEs is for the most part based on ad-hoc small scale surveys commissioned by financial intermediaries, trade association and other representative organisations. One such survey of 1000 UK SMEs finds that perceptions regarding the effect of Brexit were split evenly with 25% of firms sampled stating Brexit would be a positive, and 29% stating it would be a negative (Aldermore, 2017). Medium-

sized firms (43% of those sampled) are more positive regarding the potential impact of Brexit. Another survey of UK firms finds small firms were more positive about the impact of Brexit on exports than larger counterparts (Bloom et al, 2017). The results of a Boston Consulting Group study suggest that over 50% of UK SMEs had no plans for change, 25% had conducted some internal planning, and around 20 % were actively executing changes to prepare for Brexit (AFME, 2017).

A Federation of Small Business (FSB) study uses a sample of approximately 2,000 survey responses to investigate the potential trade implications of Brexit (FSB, 2017). Small exporting firms are split evenly between those expecting minimal change (42%), and those expecting material change (49%) to trading arrangements following Brexit. Of the latter, a larger number expected to export less (29%) relative to counterparts who expected to export more (20%). A further study by the FSB found that more than a quarter of all small firms in Scotland employed EU workers (FSB Scotland, 2017). For these firms it was the likely impact of Brexit on the supply of labour which generated the greatest level of uncertainty. Overall and while somewhat mixed, the evidence to date appears to suggest that the opaque and ambiguous nature of the Brexit process is a major consideration for UK SMEs (Cumming and Zahra, 2016; FSB, 2017). While the likely impact of Brexit is multifaceted and likely to persist over time, clearly more detailed empirical evidence is required regarding the likely effects on SMEs.

3. Data, Methods and Descriptive Analysis

3.1 Data

The data used in the present study utilises a nationally representative survey from the year 2 (2016) LSBS produced by BEIS. Small Business Surveys produced by the BEIS have been used frequently by researchers to examine various issues affecting SMEs (see Lee et al, 2015). Our sample covers a total of 9,248 UK small business owners and managers that were surveyed by BMG Research Ltd via computer assisted telephone interviews in the immediate aftermath of the Brexit referendum (between August 2016 and January 2017). One of the innovative aspects of the Year 2 (2016) of the

LSBS is the introduction of a specific question asking whether the UK exit from the EU is perceived by entrepreneurs and/or small business managers as a *major obstacle to the success of your business in general*. The survey also includes questions which ask entrepreneurs and small business managers to gauge the likely impact of Brexit on future strategic plans in terms of capital expenditure, willingness to seek external finance, undertake new product development and sell to overseas markets. The LSBS therefore provides an insight to business ambitions by gauging the extent to which SMEs aim to: grow sales; access external finance; invest in capital equipment; and develop and launch new products and services. Table 1 provides a summary of the data items (survey questions) drawn from the LSBS and definitions of the key variables.

3.2 Methods

Assessing the impact of Brexit on SMEs presents significant empirical challenges given that various factors may explain both the future strategic intentions of SMEs, and whether SMEs perceive Brexit as a significant obstacle to future business success. We address this potential endogeneity by estimating simultaneously the relationship between subjective views of Brexit and self-reported future plans of SMEs via a recursive bivariate probit model. This comprises a two equation binary outcome model with correlated error disturbances as follows:

$$I_i = \beta'X_i + \gamma BREXIT_i + v_{1i},$$

$$BREXIT_i = \beta'X_i + v_{2i}$$

I_i is a binary measure of future strategic intentions for SME i . $BREXIT_i$ is the latent propensity that SME i reports that Brexit is a potential obstacle for its business. X_i is a vector of control variables. These include: Location (urban, rural), size (zero employees; micro, 1 – 9 employees; small, 10 – 49 employees; medium, 50 – 249 employees); Innovative (in terms of process and products); Exporter; Female led; Makes surplus (profit); Age (>5 years, 6 – 10 years, 11-20 years and 20+ years);

legal status (sole proprietorship, company, partnership or other); has a business plan; and family owned. The error terms, v_{1i}, v_{2i} are distributed identically as bivariate normal with zero mean, unit variance and correlation coefficient, ρ , independently across observations.⁷ A detailed description of the variables used in the regression analysis is available in Table 1. Pairwise correlation coefficients are presented in Table 2.

3.3 Descriptive Analysis

A unique characteristic of the LSBS in 2016 was that SMEs were asked whether Brexit would represent a major obstacle to their business. Responses to this question allow us to gauge the potential effect of Brexit on SMEs, and link these to the future strategic intentions of firms regarding access to finance, investments, innovation and growth. Table 1 shows that on average 16% of our sample of SMEs consider Brexit as a major obstacle for the success of their business. Figures 1-4 offer additional descriptive statistics on the proportion of SMEs that consider Brexit as a major obstacle.

Table 1. Description of variables and descriptive statistics

Variable	Details	Obs.	Mean (survey weighted)	Standard Deviation
UK exit from the EU				
Brexit as a major business obstacle	SME responds affirmatively to the following question: Would you say that UK exit from the EU is a major obstacle to the success of your business in general?	9,221	.1598734	.3665085
Future Strategic Intentions				
Aim to grow sales	SME aims to grow sales in the next 3 years	9,221	.4884567	.4998938
Seek external finance	SME is "very likely" or "fairly likely" to approach external finance providers in the next 3 years	9,026	.1609357	.367492
Capital Investments	SME plans to make capital investment (in premises, machinery etc.) in the next 3 years	9,221	.2549132	.4358361
New products/Services	SME plans to develop and launch new products in the next 3 years.	9,221	.2791477	.4486046
SME innovation capacity and international trading activity				
SME Innovator	SME has introduced (i) new or significantly improved goods or services or (ii) business introduced any new or significantly improved processes for producing or supplying goods or services in the last 3 years	9,166	.3241119	.4680676
SME exporter	SME exported goods or services in the past 12 months (outside UK)	9,191	.1214882	.3267115
SME characteristics				
Employment size (excluding owners and partners, across all sites)	<i>0 No employees</i>	9,221	.7598958	.4271697
	<i>1-9 Micro</i>	9,221	.196964	.3977265
	<i>10-49 Small</i>	9,221	.0370733	.1889518
	<i>50-249 Medium</i>	9,221	.0060669	.0776577
Female-led	More than 50% of the business is owned by female	8,794	.2185447	.4132824
Profit	Taking into account all sources of income in the last financial year, SME generated a profit or surplus.	8,816	.8047875	.3963867
Age of business (This includes under all ownerships and all legal statuses)	<i>0 - 5 years</i>	9,194	.1712755	.3767701
	<i>6 - 10 years</i>	9,194	.1847387	.3881066
	<i>11 - 20 years</i>	9,194	.235043	.4240487
	<i>More than 20 years</i>	9,194	.4089428	.4916654
	<i>Other (e.g. Limited Liability Partnership, Limited Liability Company, etc.)</i>	9,221	.0335031	.1799559
Legal Status	<i>Sole Proprietorship</i>	9,221	.4727399	.4992834
	<i>Company</i>	9,221	.4202252	.4936217
	<i>Partnership</i>	9,221	.0735318	.2610217
Business Plan	SME has a formal written business plan	9,073	.3517724	.4775497
Family owned	SME is a family owned business, that is one which is majority owned by members of the same family	9,125	.8769901	.3284666
Urban	SME located in an urban area (categorization provided by LSBS Survey)	9,216	.7096741	.4539374

Table 2. Pairwise correlation coefficients

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brexit	(1)	1										
Employment size	(2)	0.0741*	1									
Innovative	(3)	0.1329*	0.1525*	1								
SME exports	(4)	0.2100*	0.1355*	0.1922*	1							
Female-led	(5)	-0.0458*	0.0267	-0.0273	-0.1043*	1						
Profit	(6)	-0.0145	0.0447*	-0.0103	0.0278*	-0.0763*	1					
Business age	(7)	-0.0302*	0.2174*	-0.0289*	0.0429*	-0.0082	0.0122	1				
Legal Status	(8)	0.0618*	0.1602*	0.0485*	0.1034*	-0.1597*	0.0718*	0.0124	1			
Business Plan	(9)	0.0745*	0.3595*	0.1985*	0.0710*	0.0495*	-0.0460*	-0.0091	0.0919*	1		
Family owned	(10)	-0.0375*	-0.3475*	-0.0793*	-0.0876*	-0.0642*	0.0759*	-0.0951*	0.0014	-0.2441*	1	
Urban	(11)	0.0521*	0.0832*	0.0367*	0.0406*	0.0118	-0.0224	-0.0262	-0.0573*	0.0626*	-0.1281*	1

Note: Coefficients marked with * are significant at the 1% level.

Figure 1. UK exit from the EU as a major obstacle to the success of the business by employee size)

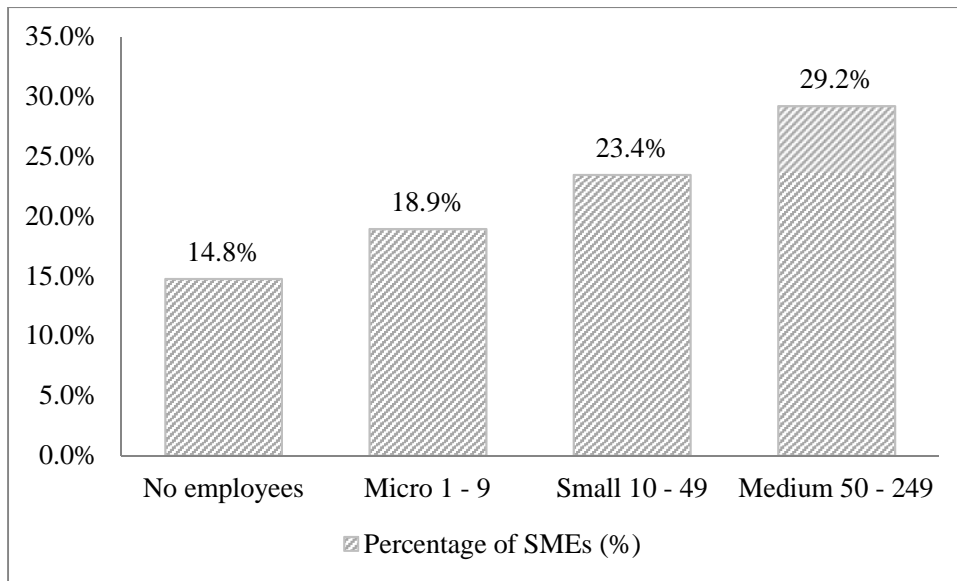


Figure 2. UK exit from the EU as a major obstacle to the success of the business by location

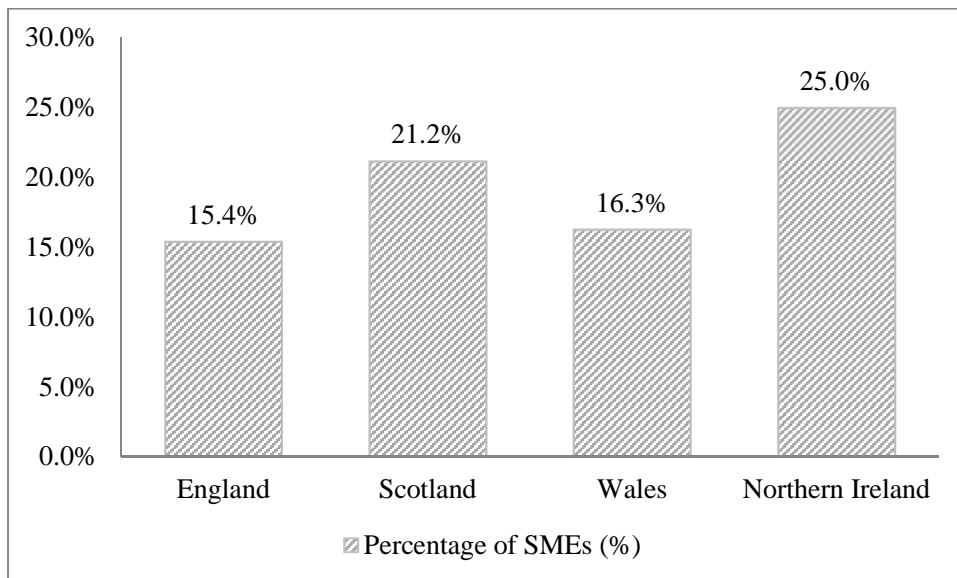


Figure 3. UK exit from the EU as a major obstacle to the success of the business by broad industry sector

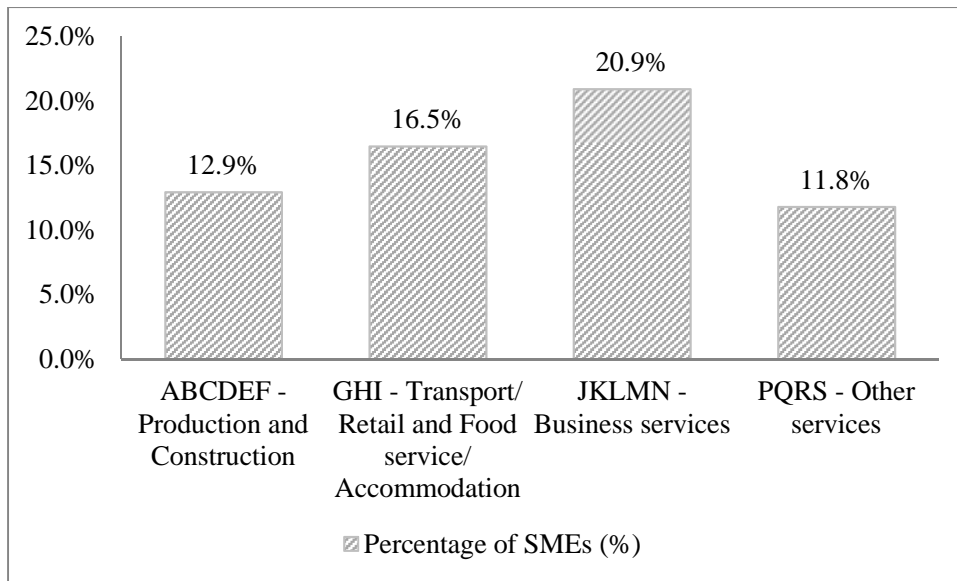
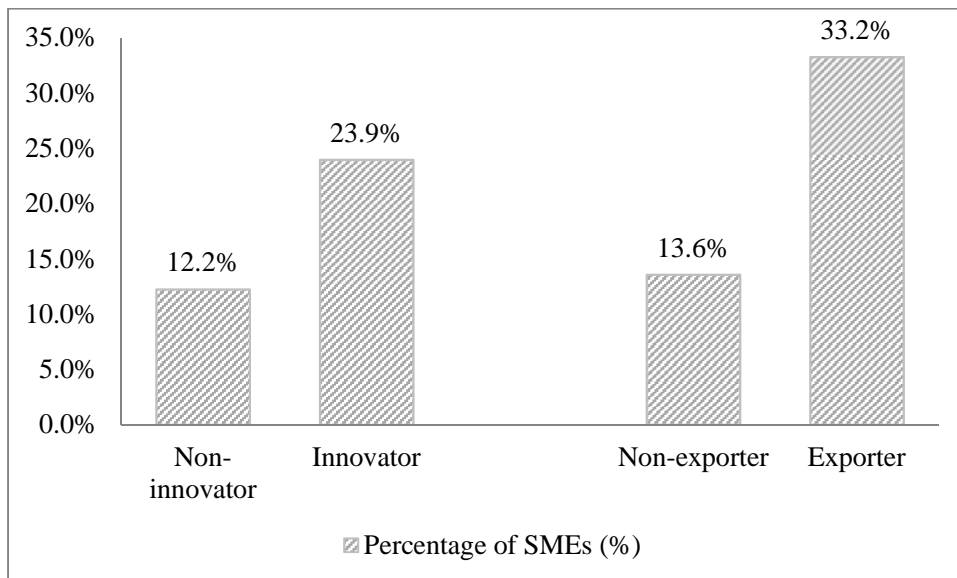


Figure 4. UK exit from the EU as a major obstacle to the success of the business by innovation capacity and international trading activity



Medium-sized SMEs are most concerned about Brexit (29.2%) followed by small SMEs (23.4%), micro SMEs (18.9%) and SMEs with zero employees (14.8%). Figure 2 suggests that SMEs located in Northern Ireland (25%) and Scotland (21.2%) consider Brexit as a major obstacle compared to counterparts located in Wales (16.3%) and England (15.4%). At sectoral level, Figure 3 suggests that business services have the highest proportion of SMEs that consider Brexit as a major obstacle followed by transport/retail and accommodation (16.5%), production and construction (12.9%) and other services (11.8%) sectors.

Table 1 also reports descriptive statistics about future strategic intentions of SMEs in our sample. In particular, we observe that 48.8% of SMEs in the sample aim to grow sales over the next three years. SMEs that plan to make capital investments (in premises and machinery) in the next three years represent 25.5% of our sample. 27.9% of SMEs in the sample have plans to develop and launch new products and services in the next 3 years. 16% of SMEs are *very likely* or *fairly likely* to approach external finance providers in the next 3 years.

A series of covariates are used to account for other differences across SMEs. In terms of innovation capacity and international trading activity of SMEs, 32.4% of SMEs in our sample had innovated (by introducing new or improved goods, services or processes) in the past three years, and 12.1% had exported goods or services outside of the UK in the past 12 months. Figure 4 shows that both innovators and exporters are significantly more concerned (23.9% and 33.2% of SMEs) about Brexit relative to non-innovator and non-exporter counterparts (12.2% and 13.6% of SMEs). Additional control variables include firm size, firm age, legal structure, location (urban/rural), extent of strategic planning, whether the firm is family owned, gender of leader, and whether the firm makes a surplus or loss. The population of SMEs in the UK is characterized by a large proportion of firms with zero employees (75.9%). 21% of SMEs are female-led. 80.4% of SMEs in our sample made a surplus in last financial year. 17.1% of SMEs were 0-5 years old, 18.4% are 6-10 years old, 23.5% are between 11 – 20 years old, and 40.8% are well-established firms exceeding 20 years. Sole proprietorship SMEs represent around 47.3% of our sample, while companies represent 42% of the sample. 35% of the

SMEs in our sample declare having a business plan in place. 87.9% of SMEs are family-owned, and 70.9% are located in an urban area.

4. Results

The results of estimating our regression model are reported in Tables 3 through 6. For ease of interpretation, these tables present average marginal effects (AMEs) rather than parameter estimates. The AMEs indicate the change in probability of the independent variable when the independent variable switches from the reference category to the category in question, holding all other independent variables at their observed values. That is, the change is computed for each observation in the estimation sample and then averaged (Cameron and Trivedi, 2010; Long and Freese, 2014). Table 3 confirms the negative association between Brexit and a firm's aim to grow sales in the next three years. Considering Brexit as a major obstacle decreases the probability that a SME will aim to grow sales by 28.1%. We also analyse how this negative impact differs by SME innovative activity (SMEs that had engaged in product or process innovation) and international trading activity (firms exporting to countries outside of the UK). Figure 5 shows that considering Brexit as a major obstacle significantly lowers the probability of the ambition of SMEs to grow their sales within the next three years. This represents a reduction of 28.1% and 30.1% in the expected probability of aiming to grow for non-exporters and exporter SMEs respectively. It also shows a reduction of 27.6% and 30.9% in the expected probability of aiming to grow for non-innovator and innovator SMEs respectively.

Table 4 presents evidence regarding the impact of Brexit on SME future strategic intentions to access external finance in the next three years. Our results suggest that those SMEs that consider Brexit as a major business obstacle are less likely to approach external finance providers in the next three years. This effect is economically important as it represents a 24.7% lower probability relative to SMEs that do not consider Brexit as an obstacle. In terms of SME innovation capacity and international trading activity, considering Brexit as a major obstacle translates to a lower probability of seeking external finance within the next three years (Figure 6). This represents a reduction of 23.7%

and 31.1% in the expected probability in approaching external finance providers for non-exporters and exporter SMEs respectively. It also shows a reduction of 21.2% and 31.6% in the expected probability of aiming to grow for non-innovator and innovator SMEs respectively. In other words, innovative SMEs seem particularly vulnerable to the negative effects of Brexit.

Tables 5 and 6 present evidence regarding the impact of Brexit on SME plans to make capital investments, and develop and launch new products and services in the next three years. The results for capital expenditures are reported in Table 5, and suggest that those SMEs that consider Brexit as a major business obstacle are less likely to have plans to make capital expenditures in the next three years. This effect is statistically and economically significant, representing a 26.4% lower probability with respect to those SMEs that do not consider Brexit as an obstacle. Figure 7 assesses the impact on capital investment by strategic orientation in terms of their innovation capacity and international trading activity. We find that both non-exporters and exporter SMEs that consider Brexit as a major obstacle are associated with a reduction of 25.9% and 29.8% in the expected probability of making capital investments. A similar prediction is observed for non-innovator and innovator SMEs, where the corresponding figures are 22.3% and 35.2% respectively.

Table 3. Impact of Brexit on aim to grow the sales of the business in the next 3 years -Maximum likelihood estimates of recursive bivariate probit

	=1 Aim to grow	=1 if Brexit is a major obstacle
Brexit is a major obstacle	-0.281*** (-5.36)	
SME innovator	0.179*** (11.79)	0.086*** (11.62)
SME exporter	0.145*** (3.63)	0.137*** (5.24)
Size: Micro 1 - 9	0.119*** (5.87)	-0.004 (-0.44)
Size: Small 10 - 49	0.212*** (6.44)	0.007 (0.47)
Size: Medium 50 - 249	0.315*** (9.38)	0.032 (1.22)
Female led	-0.037** (-2.06)	0.016 (1.34)
Makes surplus	0.007 (0.26)	0.018 (1.49)
Business age: 6 - 10	-0.105*** (-3.40)	-0.024* (-1.66)
Business age:11 - 20	-0.160*** (-10.46)	-0.032 (-1.59)
Business age: 20+	-0.234*** (-13.63)	-0.046** (-2.35)
Legal status: Sole proprietorship	-0.121** (-2.08)	-0.011 (-0.23)
Legal status: Company	-0.029 (-0.49)	0.064* (1.68)
Legal status: Partnership	-0.007 (-0.09)	0.080* (1.95)
Has business plan	0.135*** (5.89)	0.032** (2.09)
Family owned	0.004 (0.24)	0.020 (1.56)
Location: Urban area	0.048** (3.17)	0.047** (2.88)
N		8,186
ρ		0.6098468 (0.1154368)
Wald test of $\rho=0$		chi2(1) = 14.8679 Prob > chi2 = 0.0001
Log pseudo likelihood		-8601.1487

Notes: Sectoral and regional dummies are included in all specifications. Reported figures are marginal effects. Z-scores are reported in parenthesis. Omitted Categories: Size (Micro 1 - 9), Age (0 - 5), Legal (Other). ***, ** and * refer to the significant level of 1%, 5% and 10%, respectively. Standard errors clustered at region*sector*size level.

Figure 5. Impact of Brexit on aim to grow the sales of the business in the next 3 years by SMEs' innovation capacity and international trading activity (Predicted probabilities 95% Confidence Intervals)

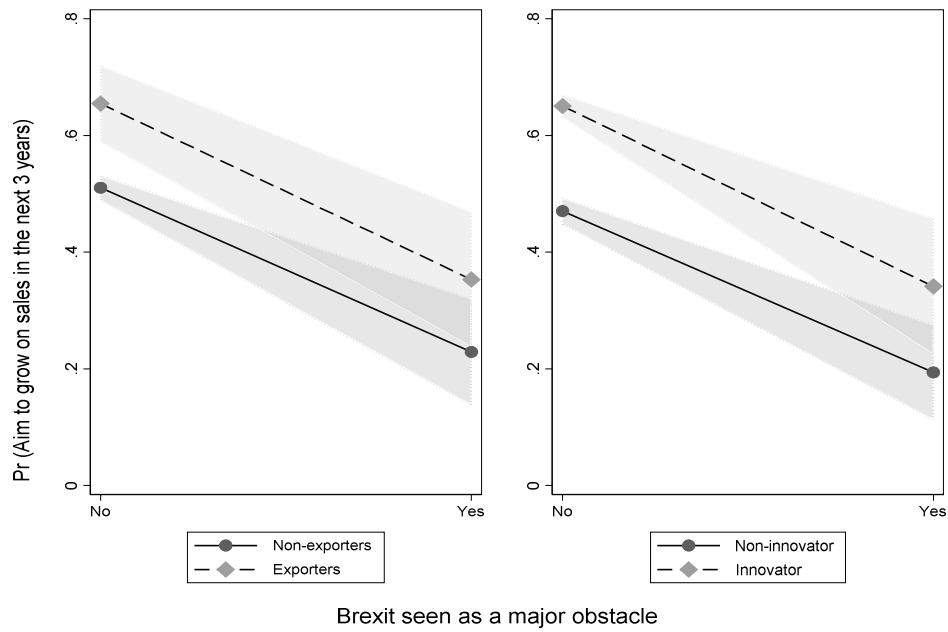


Figure 6. Impact of Brexit on plans to approach external finance providers in the next three years is fairly or very likely by SMEs' innovation capacity and international trading activity (Predicted probabilities 95% Confidence Intervals)

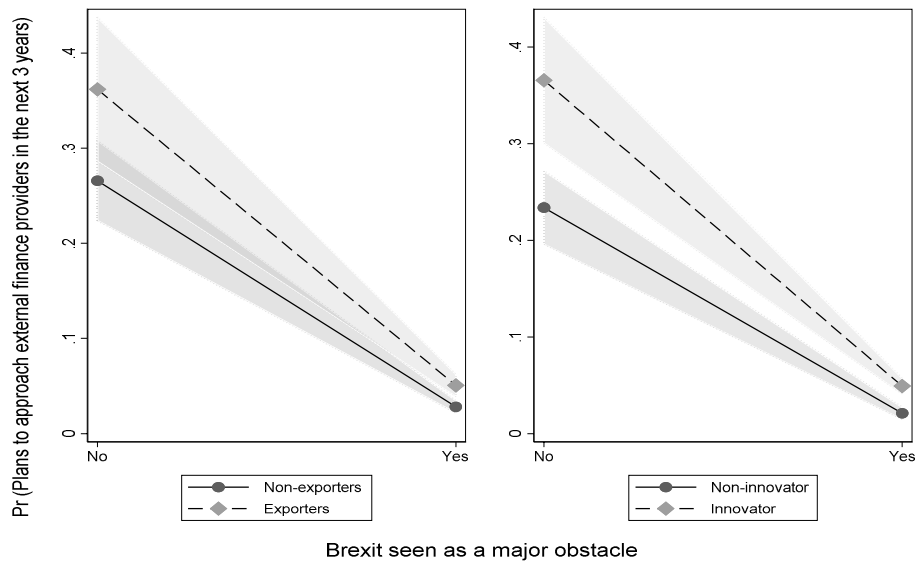


Table 4. Impact of Brexit on plans to approach external finance providers in the next three years is fairly or very likely - Maximum likelihood estimates of recursive bivariate probit

	=1 Plans to seek external finance	=1 if Brexit is a major obstacle
Brexit is a major obstacle	-0.247*** (-9.51)	
SME innovator	0.115*** (7.66)	0.086*** (8.38)
SME exporter	0.084*** (4.47)	0.141*** (5.42)
Size: Micro 1 - 9	0.032** (2.17)	-0.006 (-0.75)
Size: Small 10 - 49	0.077*** (4.01)	0.005 (0.37)
Size: Medium 50 - 249	0.123*** (3.78)	0.025 (0.95)
Female led	0.009 (0.63)	0.015 (1.09)
Makes surplus	-0.032* (-1.85)	0.021* (1.77)
Business age: 6 - 10	-0.041** (-2.00)	-0.017 (-0.89)
Business age:11 - 20	-0.068*** (-3.30)	-0.033 (-1.57)
Business age: 20+	-0.078*** (-6.04)	-0.042** (-2.25)
Legal status: Sole proprietorship	0.013 (0.24)	-0.005 (-0.09)
Legal status: Company	0.080 (1.40)	0.070* (1.66)
Legal status: Partnership	0.110** (2.28)	0.088* (1.90)
Has business plan	0.081*** (4.87)	0.031** (2.23)
Family owned	-0.011 (-0.52)	0.016 (1.38)
Location: Urban area	0.044** (2.88)	0.046** (3.23)
N		8,074
ρ		0.9302464 (0.1172094)
Wald test of $\rho=0$		chi2(1) = 3.63717 Prob > chi2 = 0.0565
Log pseudo likelihood		-6848.7499

Notes: Sectoral and regional dummies are included in all specifications. Reported figures are marginal effects. Z-scores are reported in parenthesis. Omitted Categories: Size (Micro 1 - 9), Age (0 - 5), Legal (Other). ***, ** and * refer to the significant level of 1%, 5% and 10%, respectively. Standard errors clustered at region*sector*size level.

Table 5. Impact of Brexit on plans to make capital investment (in premises, machinery etc.) in the next three years - Maximum likelihood estimates of recursive bivariate probit

	=1 plans to make capital investment	=1 if Brexit is a major obstacle
Brexit is a major obstacle	-0.264*** (-4.39)	
SME innovator	0.193*** (10.74)	0.087*** (10.24)
SME exporter	0.060* (1.80)	0.138*** (5.42)
Size: Micro 1 - 9	0.060*** (3.95)	-0.005 (-0.65)
Size: Small 10 - 49	0.166*** (5.95)	0.004 (0.32)
Size: Medium 50 - 249	0.293*** (5.23)	0.026 (1.00)
Female led	-0.059*** (-4.28)	0.012 (0.98)
Makes surplus	0.048* (1.72)	0.019 (1.39)
Business age: 6 - 10	0.014 (0.47)	-0.005 (-0.32)
Business age:11 - 20	-0.049*** (-3.36)	-0.024 (-1.27)
Business age: 20+	-0.064*** (-4.15)	-0.036* (-1.93)
Legal status: Sole proprietorship	-0.114* (-1.81)	-0.010 (-0.19)
Legal status: Company	-0.084 (-1.16)	0.062* (1.67)
Legal status: Partnership	0.002 (0.02)	0.086** (2.03)
Has business plan	0.076*** (3.77)	0.031** (2.53)
Family owned	0.024 (0.82)	0.016 (1.29)
Location: Urban area	-0.012 (-0.84)	0.048** (3.21)
N		8,186
ρ		0.727042 (0.2248158)
Wald test of $\rho=0$		chi2(1) = 3.74115 Prob > chi2 = 0.0531
Log pseudo likelihood		-7943.8446

Notes: Sectoral and regional dummies are included in all specifications. Reported figures are marginal effects. Z-scores are reported in parenthesis. Omitted Categories: Size (Micro 1 - 9), Age (0 - 5), Legal (Other). ***, ** and * refer to the significant level of 1%, 5% and 10%, respectively. Standard errors clustered at region*sector*size level.

Finally, Table 6 reports results of the impact of Brexit on SME plans to develop and launch new products and services in the next three years. In line with our previous findings, our results suggest a negative effect of Brexit on the probability of plans to develop and launch new products and services in the next three years. However, the effect is relatively small compared to the previous findings (as it represents a 14.3% reduction for SMEs that do not consider Brexit as a major obstacle for the success of their business). Examining SMEs in terms of their international trading activity, our results suggest that considering Brexit as a major obstacle leads to a reduction of 14.0% and 18.1% in the expected probability of having plans to develop and launch new products and services in the next three years for non-exporters and exporter SMEs respectively (Figure 8). Figure 8 also shows a reduction of 11.8% and 20.7% expected probability of having plans to develop and launch new products and services in the next three years for non-innovator and innovator SMEs respectively.

Table 6. Impact of Brexit on plans to develop and launch new products and services in the next 3 years -Maximum likelihood estimates of recursive bivariate probit

	=1 Plans to develop and launch new products and services	=1 if Brexit is a major obstacle
Brexit is a major obstacle	-0.143** (-2.59)	
SME innovator	0.303*** (10.64)	0.089*** (10.97)
SME exporter	0.164*** (4.04)	0.137*** (5.28)
Size: Micro 1 - 9	0.057*** (5.42)	-0.004 (-0.49)
Size: Small 10 - 49	0.078*** (4.17)	0.007 (0.49)
Size: Medium 50 - 249	0.080** (3.11)	0.031 (1.17)
Female led	0.013 (0.40)	0.016 (1.32)
Makes surplus	-0.016 (-0.92)	0.016 (1.30)
Business age: 6 - 10	-0.055* (-1.69)	-0.016 (-1.03)
Business age:11 - 20	-0.066*** (-4.40)	-0.031* (-1.67)
Business age: 20+	-0.107*** (-5.16)	-0.042** (-2.11)
Legal status: Sole proprietorship	0.042 (0.46)	-0.007 (-0.13)
Legal status: Company	0.106 (1.20)	0.067* (1.69)
Legal status: Partnership	0.047 (0.52)	0.081* (1.91)
Has business plan	0.102*** (10.19)	0.032** (2.23)
Family owned	0.031 (1.41)	0.020 (1.63)
Location: Urban area	0.010 (0.87)	0.045** (3.14)
N		8,186
ρ		0.5347386 (0.1939839)
Wald test of $\rho=0$		chi2(1) = 4.82534 Prob > chi2 = 0.0280
Log pseudo likelihood		-7617.4027

Notes: Sectoral and regional dummies are included in all specifications. Reported figures are marginal effects. Z-scores are reported in parenthesis. Omitted Categories: Size (Micro 1 - 9), Age (0 - 5), Legal (Other). ***, ** and * refer to the significant level of 1%, 5% and 10%, respectively. Standard errors clustered at region*sector*size level.

Figure 7. Impact of Brexit on plans to make capital investment (in premises, machinery etc.) in the next three years by SMEs' innovation capacity and international trading activity (Predicted probabilities 95% Confidence Intervals)

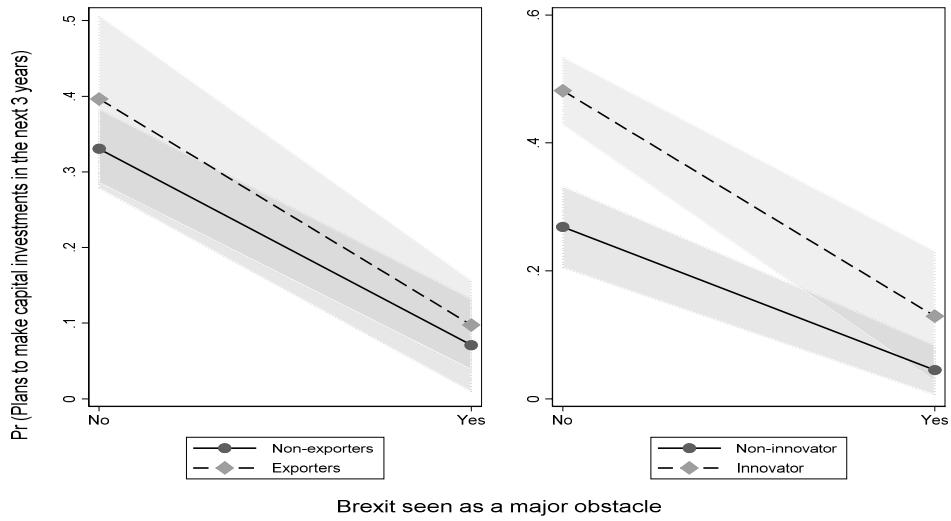
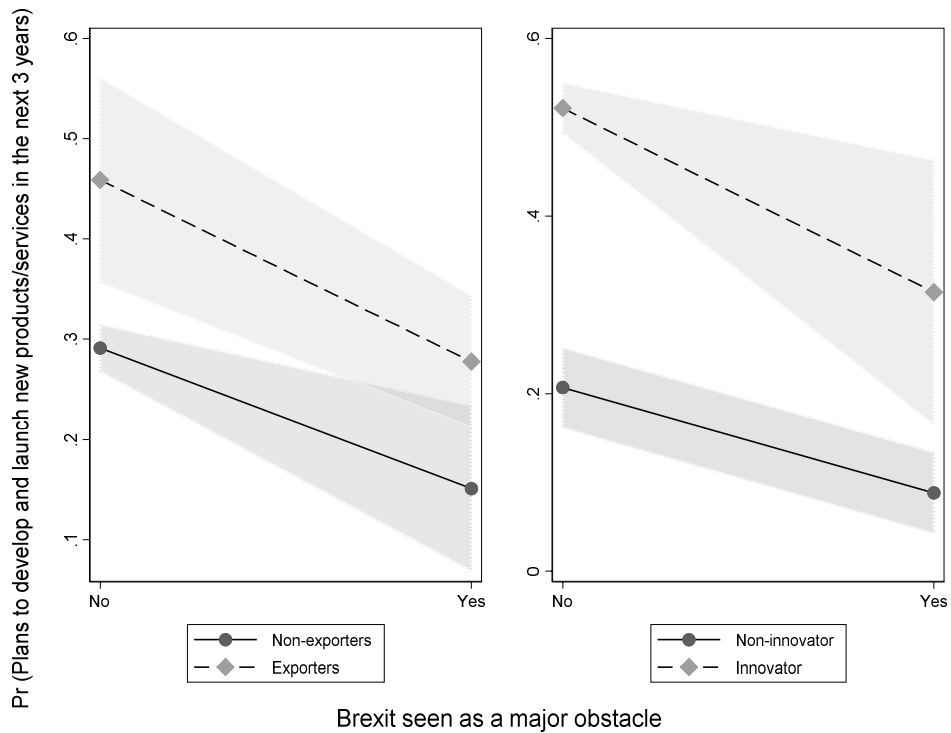


Figure 8. Impact of Brexit on plans to develop and launch new products in the next 3 years by SMEs' innovation capacity and international trading activity (Predicted probabilities 95% Confidence Intervals)



5. Discussion

5.1 SMEs Most Likely to see Brexit as a Significant Obstacle

The findings presented in sections 3.3 and 4 suggest concerns within SMEs regarding Brexit vary according to distinctive demographic, sectoral and spatial patterns. First, there appears to be a strong correlation between firm size and concerns regarding Brexit. Medium-sized SMEs view Brexit most negatively in terms of the likely impact on future success. In many respects, this is an intuitive finding given that the larger a firm becomes, the more likely they are to have international exposure (BEIS, 2017).^{viii} Second, sectoral orientation of SMEs also matters for Brexit related concerns. Business service SMEs appear the most concerned by Brexit. This may be connected to their reliance on EU nationals as employees. SMEs in manufacturing, wholesale and retail, professional services and ICT view Brexit as more of an impediment to success than those located in the hospitality, construction and transport sectors. This suggests that sectors that are more internationally orientated exhibit the greater levels of concern. Third, in terms of location, SMEs based in Northern Ireland and Scotland view Brexit more negatively than counterparts located in England and Wales. This may reflect the voting patterns of households in Northern Ireland and Scotland which voted emphatically to remain within the EU.^{ix} In the specific case of Northern Ireland it may also be strongly correlated to the highly embedded nature of the nation's integration within the wider Irish economy (Nesta, 2017).^x The differentiated perceptions of Brexit confirm the widespread heterogeneity across SMEs more generally.

There appear to be other important features of the firms most concerned by Brexit. In particular, SMEs that are young, urban and had a business plan in place express the greatest concerns regarding the impact of Brexit. The fact that younger firms view themselves as being affected seems intuitive and connected to wider liabilities of newness for more nascent organizations (Stinchcombe, 1965). The fact that SMEs located in urban areas were more negatively influenced by SMEs may be connected to the fact that those SMEs are more likely to be knowledge or service-based firms. In effect, the location variable is a proxy for sectoral origin.

In terms of business orientation, innovative and export-oriented firms are most concerned by Brexit compared to their non-innovative and non-export oriented counterparts. Viewing Brexit as a major obstacle exerts a negative effect on both innovative and export-oriented SMEs. Perhaps unsurprisingly, export-oriented SMEs were the most concerned by Brexit. Innovative SMEs also seemed particularly concerned. Again this is an intuitive finding, given the greater levels of irreversibility and uncertainty of outcomes associated with R&D and innovation more generally (Bloom et al, 2007; Caggese, 2012). This is consistent with real-options theory, which suggests that faced with uncertainty, firms making irreversible investments delay expenditure until uncertainty is reduced (Bernanke, 1983; Bloom, 2009; Meinen and Röhe, 2017).

These findings suggest that Brexit appears to impact most on the firms that are commonly viewed as the most dynamic and productive within the UK economy (Du and Temouri, 2015).^{xi} This is perhaps unsurprising as firms that are innovative and export-oriented are more likely to be embedded within, and exposed to the EU on a number of different and inter-related dimensions (especially in terms of market access for products and services, sources of human resources, raw materials and supply chain linkages).^{xii}

5.2 Impact of Brexit on the Future Strategic Intentions of SMEs

The results of our regression-based analysis suggest that the prospect of Brexit is affecting SME expectations regarding future growth, fixed capital investment, plans to seek external finance and innovation. Viewing Brexit as a major obstacle appears to exert a substantial negative effect on future expectations regarding sales growth, plans for seeking external funding and innovation.

According to the results of our empirical analysis, Brexit is also expected to hamper the ability of SMEs to undertake future capital investment over the next three years. It seems fair to assume reduced levels of capital investment will inevitably have negative repercussions for the future growth of SMEs. This finding corroborates previous evidence from other empirical studies examining the impact of uncertainty on firm-level investment (Bloom et al, 2007; Gulen and Ion, 2015; Ghosal and

Ye, 2015; Morikawa, 2016). It also chimes with others who find that political uncertainty undermines corporate investment (Julio and Yook, 2012). Interestingly, the impact of Brexit on capital investment plans was of equal importance for exporters and non-exporters. Perhaps more worryingly, innovative SMEs that consider Brexit as a major obstacle are associated with a reduction of 35.2% in the expected probability of making capital investments.

Related to the issue of capital investment, another key issue examined was whether viewing Brexit as a major impediment was likely to influence an SME's willingness to pursue external sources of finance. Our results suggest that Brexit generates a substantial negative effect on the probability of approaching external finance providers in the next three years. Given external sources of finance are often used to fund future growth activities (Levine, 1997; Cosh et al, 2009), this issue may be a useful indicator of how Brexit is likely to impinge upon capital investment plans over the longer-term. While difficult to explain, this effect could potentially be related to several different factors. First, uncertainty exacerbates information asymmetries between borrowers and lenders, which can restrict financial constraints and lower capital outlays (Ghosal and Ye, 2015). Second, it could be related to higher levels of borrower discouragement within SMEs (Kon and Storey, 2003).^{xiii} This is more common in SMEs than larger firms, and tends to become prevalent during periods of intensive economic uncertainty (Cowling et al, 2016). Third, SMEs may be concerned about disruptions to existing banking relationships post-Brexit. This may be particularly worrisome for SMEs given their traditional reliance on a single bank as their main source of external finance.^{xiv} Taken together these types of issues may intensify, and indeed amplify, Brexit-related concerns regarding access to finance.

6. Conclusion

This paper contributes to the growing literature within entrepreneurship and strategic management concerning the impact of uncertainty on future firm-level strategic intentions and behaviour. We use the Longitudinal Small Business Survey (LSBS) to investigate which SMEs are most likely to be affected by Brexit, and assess the likely impact on the (self-reported) future strategic

intentions of SMEs. This presented us with significant challenges given that certain characteristics may explain both the future strategic intentions of SMEs as well as whether SMEs perceive Brexit as a significant obstacle. Overcoming this challenge by estimating simultaneously the relationship between the subjective views of SMEs regarding whether Brexit is a likely obstacle and the self-reported strategic intentions of SMEs, we find that Brexit is likely to be a major business obstacle for innovative and export-oriented SMEs. Consequently, Brexit may result in lower levels of growth, capital investment, reduced access to external finance and lower levels of innovation.

The results of this study are particularly concerning from a longer-term productivity perspective especially given that the perceived negative effects of Brexit appear to be more prevalent for innovative and export-oriented SMEs, the firms often viewed as the high growth superstars of tomorrow. This is somewhat ironic given that developing these innovative growth-oriented firms has become a core focus of the enterprise policy at UK and EU level (Autio and Rannikko, 2016; Brown et al, 2017). How innovative SMEs respond to Brexit is likely to be a key determinant of future economic growth.

So what are the key policy and managerial implications emanating from this study? While most of the discussion to date has focused on the potential impact on large firms (both indigenous and foreign-owned), the specific concerns of SMEs have been largely overlooked (Hart, 2017).^{xv} Given the intractable issues caused by uncertainty, most SMEs have emphasized the need to minimize the disruption and upheaval caused by Brexit. Research carried out examining UK SMEs and trade associations reveals that devising suitable and effective new processes necessitated by Brexit such as customs procedures, immigration rules and new sector-specific regulations are critical for reducing the uncertainty facing firms (Balls et al, 2018). Greater transparency around these issues would undoubtedly help ameliorate the current high levels of managerial uncertainty generated by Brexit.

Overall, the results presented in this paper suggest that the decision to leave the EU is likely to affect the future strategic decisions taken by SMEs, and have resultant implications for future

performance. Owing to the perceptual nature of the underlying data and measurement error based on the nature of self-report surveys, further research should be directed towards examining alternative measures of the likely impact of Brexit, perhaps utilising longitudinal data to unpack and shed additional light of the potential impact of Brexit on SMEs over time. Until there is further clarity in relation to the future trading, immigration and regulatory environment between the UK and the rest of the EU, it will remain difficult to precisely ascertain the longer term effects of Brexit on firms and the wider economy.

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ENDNOTES

¹ A recent Bank of England Decision Makers Panel Survey (which asks senior managers of non-financial UK firms questions related to current developments and future investments, borrowing, employment, costs, sales and prices) finds that 39% of businesses responded that Brexit was the leading source of uncertainty facing firms. This uncertainty was likely to lead to: short term declines in investment; medium term declines in sales; and increases in labour and financing costs. Only 13% of respondents stated that Brexit was not an important source of uncertainty to their business (Bloom et al, 2017).

² Knight (1921) first examined the crucial role of uncertainty in shaping economic behaviour. He distinguishes between risk and uncertainty. For Knight the essential fact is that risk can be measured, but uncertainty (or Knightian uncertainty) is not readily quantifiable.

³ SMEs are defined following the European Commission definition as a firm employing less than 250 employees. Similarly, we also adopt the delineation of different size categories within SMEs used by the European Commission (2016).

⁴ Such rare, so-called “black swan events” (Orlik and Veldkamp, 2014), have consequences so far-reaching they represent something of an “unknownable risk” for firms (Diebold et al, 2010).

⁵ Additionally, a number of studies have been undertaken on likely impact of Brexit on migration (Portes and Forte, 2017), inequality (Lee et al, 2018), international business (Cumming and Zahra, 2016; Driffield and Karoglu, 2016), private equity (Wright et al, 2016), regional policy (Bell, 2017), and across a number of key industries including agriculture (Helm, 2017), construction (APPG, 2017) and financial services (Armour, 2017).

⁶ The dominance of SMEs within the business population has risen during the last 20 years, driven in large part by a rise in self-employment and zero employee businesses (Bernick, et al, 2017).

⁷ Wilde (2000) suggests that identification is achieved even if the same regressors appear in both equations. These types of models have been widely used in the health economics literature (Bridges and Disney, 2010).

^{viii} Data from the LSBS shows that while only 14% of UK micro firms export, this figure increases substantially for small (23%) and medium-sized (28%) enterprises (BEIS, 2016).

^{ix} Recent research by the Bank of England has found that consumer confidence and consumer expenditure is lower in those who voted remain compared to those who voted to leave (Financial Times, 2018). Examining how personal political viewpoints translate into entrepreneurial action within SMEs is something which merits further investigation.

^x According to data from the LSBS, SMEs in Northern Ireland rely on EU markets (53% only export to the EU) for their exports to a much greater extent than their English (27% only export to the EU) or Scottish (19% only export to the EU) counterparts (Nesta, 2017).

^{xi} Evidence suggests that innovative firms are typically the most export-oriented firms (Love and Roper, 2015).

^{xii} Smaller firms may be disproportionately concerned by Brexit if they employ a large proportion of EU nationals. A recent survey by the Creative Industries Federation of 250 members (typically small television, film and video game production companies) found that three quarters employed EU nationals and that two-thirds could not fill these vacancies domestically. This problem may be particularly acute for sectors such as the creative industries, digital media and software which are generally heavily reliant on freelance staff from across the EU (Powell et al, 2017).

^{xiii} The term discouraged borrower is defined as *a good firm, requiring finance that chooses not to apply to the bank because it feels its application will be rejected* (Kon and Storey 2003, p.47).

^{xiv} Indeed, a recent study found that more than half of SMEs only use one provider of bank finance which could prevent the ability to switch financial provider post-Brexit (AFME, 2017).

^{xv} For example, a recent survey of 653 UK owner-managed SMEs by the accountancy firm Moore Stephens found that 94% of respondents felt that the UK government was ignoring their concerns about Brexit.



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