

Expectations of access to debt finance for SMEs in times of uncertainty: Evidence from the Brexit Referendum

Abstract This paper examines SMEs' expectations of access to debt finance in times of uncertainty. In particular, we study whether relationship lending affects British SMEs' concerns about future access to debt finance after the UK referendum on EU membership (the so-called Brexit referendum). By using a unique survey, we find that relationship lending significantly reduces SMEs' expectations of being financially constrained, although the same does not hold for firms engaging in product innovation. Our results are robust after controlling for accounting information disclosure and for the relationship between the expectation of access to debt finance, the prospect of growth, and changes in business strategies.

Keywords access to debt finance · SMEs · Brexit referendum · uncertainty

1 Introduction

Previous studies have widely acknowledged that uncertainty exacerbates information asymmetries between borrowers and lenders and increases lenders' credit-risk exposure (Delli Gatti et al., 2003; Mishkin, 2011; OECD, 2015; Sette and Gobbi, 2015). As a consequence, lenders are less willing and capable to support borrowers and, in turn, firms suffer higher barriers in attempting to access debt finance (Sette and Gobbi, 2015). This issue is particularly critical for SMEs as they rely heavily on external sources of finance (Beck and Demircuc-Kunt, 2006) and are subject to more financial constraints during periods of financial turmoil/uncertainty (Ghosal and Ye, 2019). In contrast

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to large firms, SMEs often have limited internal resources, are less flexible in responding to unexpected shocks, and are less capable of hedging against uncertainty (Amoroso et al., 2017; Ghosal and Ye, 2015). In addition, they generally do not have access to public capital markets (Berger and Udell, 2002).

While recent research has specifically focused on the effects of uncertainty on the cost of credit and banks' lending strategies (Sette and Gobbi, 2015; Jiangli et al., 2008; Bolton et al., 2016), there is still a lack of studies focusing on SMEs' expectations of being financially constrained during difficult times. Analysing SMEs' expectation is important because it can help to identify which SMEs could potentially be discouraged from applying for external funding (Han et al., 2009; Freel et al., 2012; Cowling et al., 2016). In fact, the level of discouragement for SMEs tends to rise during recessions/times of uncertainty because banks tend to cut their lending (Ivashina and Scharfstein, 2010)¹. Consequently, SMEs' demand for credit may drop during periods of uncertainty. This could lead to low investment levels as bank loans still represent the SMEs' main external source of funding ². From a wider perspective, investment cuts may then result in a slow economic growth. **In times of uncertainty, even SMEs with potential good investment opportunities are more likely to be discouraged from applying for external funding as they could expect that their loan application is more likely to be rejected. As a result, SMEs could prefer to save time and cost effort required for assembling business plans and financial accounts if the loan application is potentially unsuccessful (Kon and Storey, 2003).**

This paper addresses these topics and explores possible drivers of SMEs' expectations of running up against higher debt financial barriers during periods of uncertainty.

To this end, we first examine changes in terms of SMEs' expectation of future access to debt finance between normal times and periods of uncertainty. Then, we study whether relationship lending can reduce SMEs' concerns about future debt financial opportunities. In this respect, recent studies have found that relationship lending reduces the negative effects of shocks on credit supply following periods of turmoil, such as the 2007-2009 financial crisis (e.g., Jiangli et al., 2008; Cotugno et al., 2013; Sette and Gobbi, 2015; Beck et al., 2018; Ferri et al., 2019).

Next, we examine whether firms that have introduced process and product innovations, namely innovative firms, expect to be more financially constrained in times of uncertainty. This analysis is important as innovative firms play a crucial role in spurring the growth and competitiveness of countries (Madrid-Guijarro et al., 2009). Specifically, we argue that in-

¹ For example, only 36% of English small businesses use external finance in 2017 compared to 44% in 2012 and over 7 in 10 firms claim they would rather forego growth than apply for external finance. Source: British Business Bank. Retrieved from <https://www.british-business-bank.co.uk/research/small-business-finance-markets-report-2019>.

² OECD (2018), Enhancing SME access to diversified financing instruments. Retrieved from <https://www.oecd.org/cfe/smes/ministerial/documents/2018-SME-Ministerial-Conference-Plenary-Session-2.pdf>

novative firms can face higher barriers to access debt finance compared to non-innovative ones. These firms tend to often see their finance applications rejected and are more easily deterred from applying for debt finance (Lee and Brown, 2016). This could be explained by the fact that it is more difficult for lenders to forecast innovative firms' future rents, particularly in times of uncertainty. Consequently, financial institutions could reduce the total amount of credit provided to these firms.

To analyse the expectations of access to debt finance for SMEs in times of uncertainty, we consider the Brexit referendum that took place in the United Kingdom on the 23 June 2016 as an empirical setting. The scope of the referendum was to decide on whether the UK would remain a member of the European Union (EU), or leave. The referendum resulted in a 51.9% vote for leaving, and although the referendum was not legally binding, the British government had promised to respect and implement the result. Since the referendum, there has been considerable uncertainty among policy makers and scholars on the costs and consequences of Brexit for the British economy. The prevailing view is that the UK will be negatively affected by the outcome of the Brexit referendum because of new barriers to trade and migration between the UK and the European Union (Sampson, 2017; Dhingra et al., 2016). Furthermore, the Brexit negotiations between the EU and the UK and the lack of clarity in terms of practical implications of the Brexit referendum have both induced political and economic uncertainty. While this has brought instability in key financial markets (Belke et al., 2018), its effects on the industrial sector are still debated. Therefore, the Brexit referendum represents a unique economic shock that reverberates across the entire British economy.

This shock is relevant in the context of our research for several reasons. First, empirical evidence suggests that SMEs have already been affected by the Brexit referendum. In a recent paper, Brown et al. (2019) show that SMEs have already reduced their capital investment, innovation and (in particular) exports. Second, the results of the Brexit referendum also put pressure on banks, which are still the primary source of external funding to SMEs in the UK³. After the announcement of Brexit, uncertainty has spread about future operations of national and international banks in the UK because of the expected restraints on the access to EU financial markets (e.g., Schiereck et al., 2016). In addition, Berg et al. (2019) document a 23% decline in loan issuances in the UK syndicated loan market after the Brexit referendum. Finally, changes to the SMEs' business can have important implications for the entire British economy. In fact, SMEs cover about 99% of all business, account for 60% of employment and 52% of turnover in the UK⁴.

For this analysis, we use the 2016 Business Finance Survey on SMEs provided by British Business Bank (BBB, hereafter) as it included information on

³ Bank loans cover 67% of gross new funding for UK SMEs in 2007 (Source: <https://www.ukfinance.org.uk/system/files/UK-Finance-SME-Finance-in-UK-AW-web.pdf>)

⁴ Department for Business, Energy & Industrial Strategy, Business Population Estimates, 2019. Retrieved from <https://www.gov.uk/government/statistics/business-population-estimates-2019>.

the effect of the Brexit referendum on the expectation of access to debt finance for SMEs. This allows us to fully address our research questions.

Our study provides new evidence on SMEs' concerns about access to debt finance after the 2016 Brexit referendum. Our key findings can be summarised as follows. First, we show that SMEs are more concerned about access to debt finance due to the Brexit referendum than they would have normally been. Second, we offer empirical evidence that relationship lending significantly reduces SMEs' concerns about access to debt finance in response to the Brexit referendum. Such results are robust after controlling for various firm-specific characteristics, including accounting information disclosure, alternative fixed effects, type of debt, and when we take into consideration the association between the expectation of being financially constrained, the expectation of growing less, and changes of strategies. Third, we show that innovative SMEs are more worried about access to debt finance than others. Such an effect is stronger for firms engaging more in product innovation which typically require more support from banks compared to those engaging in process innovation (Hall and Khan, 2003; Alessandrini et al., 2008). However, we also find that relationship lending does not mitigate their concerns about future finance opportunities.

The remainder of the article is organised as follows. Section II revises the literature on access to finance and growth for SMEs in periods of uncertainty. Section III provides data and methodology description. Section IV presents the main empirical evidence and the robustness check. Section V concludes.

2 Literature review and hypotheses development

Academics and policy makers agree that SMEs can often face challenges in accessing debt finance. In general these obstacles are greater than those faced by larger firms (e.g., Beck et al., 2006; Canales and Nanda, 2012; Bartoli et al., 2013; Ferri and Murro, 2015; St-Pierre et al., 2018; Duqi et al., 2018; Degl'Innocenti, 2019)⁵. This is because SMEs are more opaque than large firms as they do not usually have audited financial information and assets to be pledged as collaterals to evaluate repayment prospects. Furthermore, they do not exhibit the scale to diversify their investment portfolio and reduce asymmetric information as large firms do (Berger and Udell, 1998; Lee et al., 2015). Nonetheless, SMEs heavily depend on bank financing as a source of external funding to finance potentially viable investment opportunities as they have limited own resources and do not easily access the equity market.

⁵ The International Finance Corporation (IFC) and the World Bank estimate that 40% of formal micro, small and medium enterprises in developing countries have an unmet financing need. Instead, the total global finance gap is associated with 46% and 15% of SMEs in, respectively, East Asia and Pacific and Europe and Central Asia. Source: <https://www.worldbank.org/en/topic/sme/finance>.

During periods of financial turmoil and uncertainty, credit availability for SMEs can decrease further⁶. Consistently, several studies (For example, Beck and Demirguc-Kunt, 2006; Cowling et al., 2012; Cowling et al., 2015; Lee et al., 2015; Bartz and Winkler, 2016) provide evidence that SMEs face less access to formal sources of external finance during periods of financial turmoil/uncertainty. On the one hand, banks tend to cut their lending during such periods, especially towards small businesses (Cowling et al., 2012). On the other hand, SMEs are often discouraged from applying for external funding as they are more pessimistic about capital availability and the success of their loan application in such periods (Cowling et al., 2016). We therefore examine whether a larger number of SMEs expect to face higher barriers in accessing debt finance in times of uncertainty than in normal times. Specifically, our first hypothesis is as follows:

H1: A larger number of SMEs expect to face higher barriers in accessing debt finance in times of uncertainty than in normal times.

Relationship lending plays a crucial role for SMEs' access to debt finance both in "normal" and "bad" times. In fact, relationship lending represents an important lending technology to reduce information problems because lenders acquire detailed information through contact with the firm, its owner, and its local communities (Berger and Udell, 2002). Lenders then use this information to decide about the availability and costs of credit (Bartoli et al., 2013). More generally, relationship lending is still considered the most effective method to decrease informational asymmetries for small business lending. A tight firm-bank relationship allows for the mitigation of informational asymmetries, improving the efficiency of the bank's allocation and terms of loans (Ferri and Murro, 2015). Therefore, when in financial need, SMEs are likely to turn to the same lenders because the lack of accounting records makes it more costly to establish new relationships⁷.

Previous studies show that relationship lending can indeed alleviate financial constraints for SMEs during period of uncertainty (e.g., Sette and Gobbi, 2015, Bolton et al., 2016, Beck et al., 2018, Ferri et al., 2019). Specifically Sette and Gobbi (2015) argue that borrowers receive support from relationship lenders during a financial crisis because lenders hold an informational advantage that they are willing to preserve during period of uncertainty. In addition, Bolton et al. (2016) find that relationship lending allows SMEs to receive better lending conditions even in periods of uncertainty.

Drawing on these considerations, we also test whether relationship lending affects SMEs' expectations of debt financial constraints during times of

⁶ The "Credit Conditions Surveys" provided by the Bank of England (various years) show that use of external finance by SMEs has fallen steadily since the period before the global recession

⁷ For example, almost 33% of English SMEs contact their main bank directly when they need finance. In addition, for almost 41% of English SMEs, having an existing relationship continues to be the most common reason for choosing financial providers. Source: British business Bank. 2018 Business Finance Survey: SMEs. Retrieved from <https://www.british-business-bank.co.uk/research/small-business-finance-markets-report-2019>.

uncertainty. Specifically, we explore whether relationship lending has a positive effect on SMEs' expectations of debt financial constraints due to the liquidity "insurance" provided by the information advantages of lenders. Therefore, our second hypothesis is as follows:

H2: Relationship lending has an impact on SMEs' expectations of facing barriers in accessing debt finance in times of uncertainty.

Among SMEs, innovative firms are more financially constrained than non-innovative ones. This is driven by the fact that investments in innovation are hard to measure, costly to re-deploy, and characterised by uncertainty regarding their future rent and successful commercialisation (Freel, 2007; Hall and Lerner, 2010; Minetti et al., 2015). Innovative firms generate earnings that rely on future investment opportunities (Lorek et al., 1999). This means that their evaluation is difficult and requires additional effort from lenders. Therefore, lenders can be more reluctant in allocating financial sources to them. In times of uncertainty these difficulties are amplified, as the realisation of investment outcome is even harder for firms in general, and particularly for innovative firms. Consequently, SMEs tend to reduce their expenditure on innovation (Brown et al., 2019). Therefore, following these considerations, we provide nuanced evidence on the the impact of innovation on the expectations of access to debt finance in times of uncertainty. This is an area that has been overlooked by previous studies.

Following these considerations, we therefore elaborate the third hypothesis for the entire sample as follows:

H3: Innovative SMEs expect to be more financially constrained than non-innovative SMEs in times of uncertainty

For access to finance for SMEs, previous studies highlight the importance of distinguishing between process and product information as these two types of investments typically differ in terms of support required from banks (see for example Cohen and Klepper, 1996; Hall and Khan, 2003; Alessandrini et al., 2008). Specifically, process innovation not only requires consistent financial funds but also a wider-ranging relationship based support from financial providers for the new production strategy, the entrepreneur's creativity and vision of consumer's needs (Alessandrini et al., 2008). Although process innovation also requires large investments in new equipment, it is less sensitive to relationship banking. Consistently, previous studies have shown that relationship lending matters more for the probability of success of product innovation than of process innovation (Herrera and Minetti, 2007; Alessandrini et al., 2008; Giannetti, 2012).

Following this research stream, we examine whether relationship lending mitigates the financial concerns of firms dealing with product innovation. More specifically, our last research hypotheses are formulated as follows:

H4a: SMEs specializing in product innovation expect to be more financially constrained than SMEs specializing in process innovation.

H4b: SMEs specializing in product innovation expect to be less financially constrained if they have a previous relationship lending.

3 Data and methodology

Our main data source is the Business Finance survey conducted in 2016 by the BBB. To the best of our knowledge, this is the first paper using this survey in the context of SMEs' access to debt finance.

As far as we are aware, this is the only survey that investigates whether the outcome of the UK referendum on EU membership has affected: 1) SMEs' expectations of access to debt finance; 2) SMEs' expectations of growth; and 3) SMEs' changes to strategies (including changes to staff, sales, and investments). The UK longitudinal small business survey (LSBS) analysed by Brown et al. (2019) asks, instead, whether the Brexit referendum is perceived as an obstacle to the success of the business. On the subsample of SMEs affected by the Brexit referendum, the 2017 LSBS also asks whether future plans will be scaled up, scaled down, or remain the same. Finally, there are no questions related to the Brexit referendum in the SME Finance Monitor survey.

Specifically, BBB is a state-owned development bank founded in 2014 with the objective of increasing the supply of credit to UK SMEs. The survey was conducted between 25 October and 22 November 2016 through computer-assisted telephone interviewing with individuals responsible for managing business finance. This survey collects very detailed information for 1,535 English SMEs on individual characteristics (such as ownership structure, performance indicators, extent of internationalisation and exports, and attitude to innovations, among others), access to debt finance⁸ (including information on past applications, confidence and awareness of different finance products offered by banks and other financial providers, sources of information used for finance application and selection of a specific financial provider), and changes to expectations and strategies since the result of the Brexit referendum.

The interviewed SMEs are representative of the population based on quotas by employment size, sector, and region⁹. Table 1 summarises SMEs' responses to debt finance access after the Brexit referendum. Almost 50% of SMEs believe that it will be more difficult to get access to debt finance after the referendum. Particularly, 37% of SMEs think that access to debt finance will be slightly more difficult, while almost 13% believe it will be more difficult. Only around 7% of the SMEs have positive expectations of the effects of the Brexit referendum on access to debt finance.

⁸ Particularly, debt finance includes: bank finance (bank overdraft, bank loan, bank mortgage) and non-bank finance (government or local government grants, loans from friends and family, loans from directors, loans from other parties, leasing or hire purchases, invoice finance or factoring, credit cards, finance from government scheme, international trade office, equity finance, mezzanine finance, peer-to-peer lending, corporate bonds).

⁹ British Business Bank (2017). 2016 Business Finance Survey: SMEs. Available at <https://www.british-business-bank.co.uk/wp-content/uploads/2017/02/British-Business-Bank-Business-Finance-Survey-2016.pdf>.

[insert Table 1 about here]

First, we use a transition matrix that shows how many firms changed their beliefs related to the difficulties of accessing debt finance after the Brexit referendum. For this scope, we analyse the answers of two questions related to the difficulties on access to debt finance in general and in response to the Brexit referendum. Each question encompasses five answers which reflect the categories of difficulties of access debt finance: 1 being "A lot easier"; 2 "A bit easier"; 3 "No impact", 4 "A bit more difficult"; and 5 "A lot more difficult".

Then, we regress the expected difficulty of access to debt finance against a relationship-lending measure and other variables in an ordered logistic model. Specifically, to measure the expected obstacles of accessing debt finance, we consider a scale from 1 to 5 where 1 is the least difficult and 5 is the most difficult. We create a proxy for *Relationship lending* following the bulk of studies in this field (e.g., Uchida et al., 2006; Berger and Udell, 2006; Bartoli et al., 2013; Ferri and Murro, 2015) by considering the length of the lending relationship and fiduciary bond/trust between the firm and the financial provider. Specifically, we use the following questions: "What were the reasons for choosing that specific provider? Of those, you mentioned, which was the main reason?" and "Why did you only contact one provider of finance? Please give the main reason only". To construct the relationship lending variable, we also consider the following answers: "Existing provider/already have a relationship with/used them before" and "long-standing relationship/trust". Table 2 shows that around 17% of the SMEs have relationship lending with their main financial provider.

Consistent with the previous studies on SMEs' access to debt finance (Beck et al., 2006; Lee and Brown, 2016), we include the following control variables for SMEs' characteristics in the model: *Start up* (it equals to 1 for SMEs aged less than 1 year, and 0 otherwise); *Age 10yrs* (it equals to 1 for SMEs aged more than 1 year but less than 10 years, and 0 otherwise); *Age 20yrs* (it equals to 1 for firms aged more than 10 years but less than 20 years, and 0 otherwise); *Small size* (it equals to 1 for firms with 10-49 employees, and 0 otherwise); *Medium size* (it equals to 1 for firms with 50-249 employees, and 0 otherwise); *Export-oriented* (equal to 1 if firm has exporting income, and 0 otherwise); *Turnover(\leq £50K)* (equal to 1 if the firm's turnover is less than £50,000 in the past 12 months, and 0 otherwise); *Turnover(\geq £1M)* (equal to 1 if the turnover is more than £1 million and less than £50M, and 0 otherwise); *Turnover(\geq £50M)* (equal to 1 if turnover is more than £50 million, and 0 otherwise).

We also control for firms' awareness of financial options and confidence in their ability of securing external debt. These two aspects could both affect SMEs' expectations about future possibility of receiving debt finance. Specifically, *Awareness* is computed as the ratio of the number of external finance options that a firm is aware of to the total number of financial options avail-

able¹⁰). In addition, *Confidence* is a dummy variable with value 1 if the SME is confident in receiving external finance, and 0 otherwise. Furthermore, we also control for how difficult SMEs think it is to obtain bank finance in general (*General access to bank finance*). In this way, we examine whether the expectation of being financially constrained after the Brexit referendum is driven by the fact that SMEs do not have easy access to debt finance in general. Finally, we consider sector and region fixed effects in the model to control for local economic factors that could have affected the Brexit referendum outcome. For example, the Leave vote was strongest outside London and in the industrial sectors that experienced prolonged economic downturn, such as the manufacturing sector (Becker et al., 2017). The definitions of the variables are reported in Table A1 of the Appendix.

Table 2 shows the descriptive statistics of the SMEs' characteristics. We can note that 45% of firms carry on innovative activities (*Innovation*) and almost 45% of SMEs are more than 20 years old (*Age 20yrs*). In addition, less than 70% of the firms are micro companies and almost 20% of firms have a relatively low *Turnover* ($\leq \text{£}50\text{K}$). Finally, around 60% of the firms are aware (*Awareness*) and confident (*Confidence*) of the different financial options.

[insert Table 2 about here]

Table 3 shows the pair-wise correlation matrix. We do not observe a high correlation between each pair of independent variables¹¹.

[insert Table 3 about here]

4 Empirical Findings

4.1 Main Results

In a preliminary analysis, Table 4 displays how SMEs' beliefs about access to debt finance have changed as a consequence of the Brexit referendum. In overall, we find that SMEs are more skeptical about their chances of getting access to debt finance since the Brexit referendum. Specifically, Column 1 of Table 4 shows that 206 firms (122 + 84) have changed their expectation of accessing debt finance from 1 ("a lot easier") to 4 and 5 ("a bit more difficult" and "a lot more difficult"), respectively, after the referendum. In addition, a further 286 SMEs (196 + 90) have changed their expectation of accessing debt finance from 2 ("a bit easier") to 4 and 5 after the referendum. On the other side, only a few firms believe that access to debt finance will be easier after the Brexit referendum if they were already concerned about access to

¹⁰ The survey reports eleven possible external financial options: business angels, equity crowd funding platforms, trade finance, government or local government grants, invoice finance or factoring (asset-based finance), leasing or hire purchasing, mezzanine finance, peer-to-peer lending platforms, venture capitalists, corporate bonds.

¹¹ This is also confirmed by the variance inflation factor (VIF) that is not higher than 4.

debt finance in general ¹². Overall, consistent with *H1*, these results suggest that SMEs are more concerned about access to debt finance after the Brexit referendum than normally.

[insert Table 4 about here]

Then we test our second hypothesis (*H2*) about the impact of relationship lending on SMEs' concerns about future access to debt financing based on the effect of the Brexit referendum ¹³. Specifically, Table 5 analyses how relationship lending affects expectations of access to debt finance after the Brexit referendum. The estimation results in Column 1 show a negative association between *Relationship lending* and the expectation of being financially constrained after the referendum. Specifically, the coefficient for *Relationship lending* is negative and statistically significant at the 1% level ($\beta=-0.142$). Our results are robust when we include the regional fixed effects in Column 2 to capture the time-invariant effects. This result supports *H2* and implies that prior relationship lending with financial providers reduces firms' expectations that they will encounter future debt barriers. Moreover, the results in Table 5 show that firms that are more confident in their abilities to assess financial products are less concerned about the future access to debt finance. Specifically, the coefficient of *Confidence* is negative and statistically significant at the 5% level ($\beta=-0.183$). Instead, the coefficient of *Awareness* is not significant.

Consistent with *H3*, we find that **innovative firms (firms that engage in both process and product innovation)** expect to be more financially constrained after the Brexit referendum. The coefficient of *Innovation* is positive and statistically significant at the 10% level ($\beta=0.182$). As already explained in Section 2, innovative firms generate earnings that rely on future investment opportunities (Lorek et al., 1999). For this reason, lenders struggle to evaluate them and are more reluctant to offer sources of finance for this type of borrower. During periods of uncertainty, the realisation of their investment outcome is even harder to predict. Therefore, SMEs can expect to face higher barriers to debt finance.

[insert Table 5 about here]

Table 6 reports the estimates for the impact of process and product innovations on the expectation of being financially constrained after the Brexit referendum.

To run this analysis, we create the following identifiers to distinguish the two innovation types: *Product innovation* and *Process innovation*. Specifically, *Product innovation* is a dummy that takes a value of 1 if a SME introduced new or improved goods or services for the past 3 years, and 0 otherwise. *Process innovation* is a dummy that takes the value of 1 if a firm has introduced

¹² 1,046 SMEs answered to the question related to expected access to debt finance in general.

¹³ For this analysis we consider all the SMEs in the sample. All the SMEs that expect to be negatively affected by the Brexit referendum also expect to be financially constrained in our sample

new or improved processes for producing or supplying goods or services for the past 3 years, and 0 otherwise. Column 1 of Table 6 reports the results for *Product innovation*, while Column 2 shows the results of *Process innovation*. **Column 3 shows the results for both *Product innovation* and *Process innovation*.** Column 1 shows that firms engaging in product innovation are significantly concerned about getting access to debt finance after the Brexit referendum. Specifically, the coefficient of *Product innovation* is positive and statistically significant at the 1% level ($\beta=0.107$). We also observe that *Relationship lending* is still significantly and negatively related to the expectation of being financially constrained in times of uncertainty. However, Column 3 shows that process innovation is not significantly related to debt finance difficulties. **By comparing the coefficients of *Product innovation* and *Process innovation* in Column 3, we find that SMEs with product innovation expect to be more financially constrained than SMEs with process innovation. Specifically, the coefficient of *Product innovation* is positive and statistically significant at the 5% level ($\beta=0.088$), while the coefficient of *Process innovation* is not significant. These results are consistent with *H4a*.**

Furthermore, we test whether relationship lending can reduce the expectation of being financially constrained for both SMEs engaging in either process or product innovation. For this analysis, Columns 4 and 5 show the estimation results when *Relationship lending* interacts with the two innovative SMEs identifiers, i.e. *Product innovation* and *Process innovation*, respectively. **The findings suggest that neither of the two interaction terms has a significant coefficient. This result implies that relationship lending does not mitigate the financial concerns of SMEs engaging with product innovation and, therefore, we do not find evidence to support *H4b*.**

[insert Table 6 about here]

4.2 Additional Findings

In this section we discuss additional findings related to the control variables included in our estimations and alternative specifications of our model. As regards the other control variables, the estimates of Table 5 show that small firms (*Small size*) expect to be significantly less successful in obtaining access to debt finance. For this variable we find, respectively, a positive and significant coefficient with a β equals to 0.242. Differently from larger firms, small firms are usually more concerned with business survival and tend to be more financially constrained than other firms (Canton et al., 2013; Lee et al., 2015; Lee and Brown, 2016). Instead, older firms appear to be less worried about future financial debt options after the Brexit referendum as they usually have less trouble in accessing debt finance (Lee et al., 2015). Finally, *export-oriented* SMEs expect to be significantly less financially constrained. Previous studies argue that exporting firms benefit from easier access to debt financial markets as they are less exposed to both informational asymmetries and demand side

shocks through diversification (e.g., Greenaway and Kneller, 2007). Therefore, they could expect to have an advantage compared to non-exporting firms in terms of access to debt financial resources.

In addition, we account for possible variations across the geographical locations of the sampled SMEs by including the regional fixed effects in estimating the model. Column 2 of Table 5 shows that *relationship lending* is positively and significantly related to the expected difficulty of access to debt finance.

4.3 Robustness Checks

This section presents the additional analyses we undertook to rule out alternative stories as well as to assess the robustness of our main results. Specifically, we account for: the debt type - namely, bank and non-bank debt - that the SMEs have previously received; ii) accounting information and disclosure; ii) the association between the expectation of future barriers on accessing debt finance, expected growth and changes to strategies.

4.3.1 Debt type

In this subsection we account for the possibility that having a previous trustworthy and long-standing relationship with a financial provider has a different impact on the expectation of access to debt finance depending on the type of debt that SMEs have with a financial provider. This analysis is motivated by the fact that recent studies have shown that credit availability for SMEs in times of crisis/uncertainty depends on the specific lending technologies used by financial providers. Specifically, relationship lending-based technologies are more likely to hamper the negative effects of times of uncertainty on SMEs' credit availability compared to transaction-based lending technologies (see for example Jiangli et al., 2008; Cotugno et al., 2013; Sette and Gobbi, 2015; Beck et al., 2018)¹⁴. In addition, relationship lending-based technologies are associated with a continuation of lending at more favourable terms than transaction-based lending technologies to profitable firms during a crisis/uncertainty period (Bolton et al., 2016).

For this additional test, we therefore distinguish between bank debt and non-bank debt, which instead encompasses government or local government grants; loans from directors, friends, family, and other third parties/other organisations; leasing or hire purchase; invoice finance or factoring (asset based); finance from government schemes; international trade finance, loan through peer-to-peer lending platform; corporate bonds). This distinction is

¹⁴ Under relationship-lending technologies, financial providers rely primarily on the collection of qualitative information via personal interaction/acquaintance, the so-called *soft information* (Rajan, 1992). Instead, transaction/asset-based lending technologies mainly rely on hard quantitative information, such as information derived from the borrowers' balance sheets and/or the collateral guarantees/assets offered as the primary source of repayment (Berger and Udell, 2006).

motivated by the fact that most of the non-bank debt received by SMEs consists of transaction-based lending technologies (asset-based such as factoring and leasing) where firms' assets are pledged to the lender as collateral to evaluate repayment prospects. Accordingly, we create two sub-samples for SMEs that have received: only bank debts in the previous three years, and only non-bank debts in the previous three years. In line with previous studies, we expect a stronger relationship between *relationship lending* (having a long-standing relationship/trustful relationship with a main financial provider) for the SMEs dealing with relationship-based lending technologies rather than transaction/asset-based lending technologies. Columns 3 and 4 of Table 5 report the estimates. As expected, our findings show that relationship lending is only significant for bank debt and not for non-bank debt.

4.3.2 Accounting information disclosure

Another source of concern for our results is that firms with limited accounting information can face higher barriers to debt finance as financial providers struggle more in evaluating them. As a robustness check, we therefore control for the possibility that the association between *relationship lending* and the expectation of being financially constrained is driven by the type of information disclosed by a firm. For example, there could be an overlap between SMEs that have lending relationships and an accounting information disclosure policy. In this case, we cannot distinguish which effect prevails between relationship lending and accounting information disclosure. Specifically, we control for three additional variables in the main model: *Business Plan*, a dummy variable taking a value 1 if a firm has a formal written business plan, and 0 otherwise; *Accounting info*, a dummy variable taking value 1 if a firm produces regular monthly or quarterly management accounts, and 0 otherwise; and *Accountant* that takes the value of 1 if a firm has a dedicated finance person that manages its accounts or compiles tax returns, and 0 otherwise.

Column 5 of Table 5 shows that our previous findings on *relationship lending* are still robust when including additional controls in the model. Meanwhile, both *Business Plan* and *Accounting info* are important in explaining the expectations of future barriers to debt finance. Specifically, *Business Plan* is significantly and positively related to the expectation of being financially constrained after the Brexit referendum. This can be explained by the fact that firms can be more critical about their capabilities of realising targets and goals in times of uncertainty. Instead, *Accounting info* is significantly and negatively related to the expectation of being financially constrained. In line with the expectations, firms producing regular monthly or quarterly management accounts are less concerned about barriers to access to debt finance. The reason could be that firms with more transparent accounting information can more easily get financial resources from different providers compared to more opaque firms (e.g., Bartoli et al., 2013; Berger and Udell, 2006).

4.3.3 Difficulty in accessing debt finance, growth and and changing of strategies

In this subsection we account for the possible association between the expectation of being financially constrained and growing less, and changing strategies in times of uncertainty. This link could affect the results in Table 5. Uncertainty shocks can lead to a decrease in investments and employment, especially for SMEs (Ghosal and Ye, 2015; Handley and Limão, 2015). In periods of uncertainty, firms in fact prefer to curtail their investments or postpone them until a recovery occurs (e.g., Ghosal and Loungani, 2000; Bulan, 2005; Bloom et al., 2007; Czarnitzki and Toole, 2011). Particularly, firms can be more reluctant to increase their investments if these activities are fully irreversible because they contribute towards the salaries of personnel and the purchase of task-specific equipment and materials (Czarnitzki and Toole, 2011). The drop in investments can increase SMEs' growth constraints and worsen their access to external finance as well (Beck and Demircuc-Kunt, 2006). Therefore, SMEs' perspectives on the three dimensions - changes of strategies (in terms of investment plans, exports and employment), future growth in their business, and future financial constraints - can indeed influence each other.

For this additional analysis, we use a trivariate probit model to jointly consider SMEs' changes of strategies (*Strategy change*) concerning their decisions on investment plans, exports and employment, SMEs' expectations of future growth (*Growth_expectation*), and also their expectations of financial constraints after the Brexit referendum *Financing_expectation*. The dependent variable *Financing_expectation* is equal to 1 if the firm expects to face difficulties in obtaining debt finance after the Brexit referendum, and 0 otherwise. For the variables *Strategy change* and *Growth_expectation*, we consider the following question: "Has your organisation made any of the following changes since the result of the Brexit referendum?". Specifically, *Growth_expectation* is a dummy variable that takes the value of 1 if a SME expects to grow less in response to the Brexit referendum, and 0 otherwise. To construct *Growth_expectation*, we consider the following answer: "Expect to grow less because of the outcome of the Brexit referendum". *Strategy change* is a dummy variable that takes the value of 1 if a SME states that it has made changes in its investment plans, exports or staff employed since the result of the the Brexit referendum, and 0 otherwise.

Table 7 shows the results of the trivariate probit model. Consistently with the expectations, we find that there is a significant and positive association between *Financing_expectation* and *Strategy Changes* and *Growth_expectation*. In particular, the correlation coefficients $\rho_{v1,v3}$, $\rho_{v2,v3}$ and $\rho_{v1,v3}$ are positive and significant at 1% (respectively equal to 0.31, 0.29 and 0.48). Next, Table 7 shows that the results for *Financing_expectation* are consistent with those reported in Table 5. Therefore, our main results hold when we control for growth and financing expectations and changes of strategies.

As an further analysis, we consider employment cuts (reduction of the number of employees or of the amount of working hours) in response to the Brexit referendum. Specifically, we use the following question to construct *Employment cut*: "Do you expect to make any of the following changes over the next

12 months as a result of the Brexit referendum?" *Employment cut* is a dummy variable that takes a value equal to 1 if the SME has already cut its employment, otherwise it is 0 (in terms of number of employees and number of working hours)¹⁵ in response to the Brexit referendum, otherwise it is 0.

As before, we find a positive and significant association between difficulty of accessing debt finance, less growth, and employment cuts. Specifically, the correlation coefficients $\rho_{v1,v3}$, $\rho_{v2,v3}$ and $\rho_{v1,v3}$ are positive and significant at 1% (respectively equal to 0.30, 0.28 and 0.71). Again, Table 7 shows that the results for *Difficulty of accessing debt finance* are consistent with those reported in Table 5.

By focusing on the other dependent variables, *Strategy Changes* and *Grow less*, we find that *relationship lending* is significant only for *Strategy Changes*. As regards other firm characteristics, we find that export-oriented firms (*Export-oriented*) have already changed their strategy or cut their employment and expect to grow less after the Brexit referendum. As pointed out by Brown et al. (2019), this is an expected finding given the possible disruptions to trade as a consequence of leaving the EU. Instead, being confident in assessing products from multiple providers (*Confidence*) seems to reduce SMEs' concerns about growth. *Confidence* does not exert any significant effect on *Employment cut*. Finally, we find that both small and medium firms have already cut their employment in response to the Brexit referendum.

[insert Table 7 about here]

5 Conclusion

This paper investigates SMEs' perceived access to debt finance in times of uncertainty. Specifically, we consider the result of the so-called Brexit referendum that took place in the United Kingdom on the 23 June 2016 for this analysis as an example of a period of uncertainty. This empirical setting also appears to be appropriate for this investigation as SMEs play a pivotal role in the competitiveness and growth of the UK economy¹⁶.

By using a novel dataset, our findings show that relationship lending ameliorates the effect of uncertainty induced by the Brexit referendum on SMEs' future access to debt. However, having a prior and trustworthy relationship with a financial provider appears to matter, especially in the case of banking debt. This is reasonable since the banking channel still represents the main source of financing for SMEs. In addition, SMEs tend to be opaque, lacking in detailed financial information, and they usually get access to debt finance via relationship lending with banks.

¹⁵ We consider the following answers: "decrease number of hours of existing staff"; "make staff redundant"; "use staff on different contracts (e.g., casual or zero-hours contract workers or self-employed workers)"; "make other changes to staff employed".

¹⁶ National Endowment for Science, Technology and the Arts (2017). The state of small business: Putting UK entrepreneurs on the map. London: NESTA.

These findings indicate that SMEs could be able to take advantage of existing relationship lending by being less discouraged in fulfilling loan/debt applications. This is important because even SMEs with good investment opportunities could be reluctant to spend time and resources in preparing the requested documents to apply for a loan/debt if they do not think to be successful with their applications. Instead, previous relationship lending with a financial provider could help reducing such concerns. In general, relationship lending mitigates existing asymmetric information between financial providers and SMEs. As a result, SMEs could have more opportunities to get access to the essential financial funds if they already had a previous lending relationship. Consistently, our results suggest that having a lending relationship could also help reducing SMEs' concerns about future access to debt finance in times of uncertainty. This is crucial as SMEs have limited owned resources and only the entrepreneurs that can successfully receive essential financial resources can manage to sustain their investments. On this regard, as an additional result, we in fact find a strong positive association between the expectation of being financially constrained and of growing less, and changes of strategies. Specifically, we show that SMEs that expect to be financially constrained also tend to engage more in employment cuts. Therefore, expectation on future access to debt finance has important implications for SMEs' investments and growth.

We further investigate whether innovative firms expect to be more financially constrained than non-innovative firms after the Brexit referendum. Innovative firms are traditionally more vulnerable as their outcome is uncertain and difficult to monitor. For this test, we also distinguish between process innovation and product innovation since these two types of investments require different support from the banks (Alessandrini et al., 2008). Our findings show that during periods of uncertainty firms engaging with product innovation appear to be more concerned about future debt finance than less innovative firms. However, we find that relationship lending does not mitigate their concerns about future financial opportunities. This result provides an important warning as innovative firms could be particularly discouraged from investing. This could further weaken the entire economic outlook after the Brexit referendum. Innovative firms cover an important role in spurring the growth and competitiveness of countries (Madrid-Guijarro et al., 2009).

This paper contributes to the literature on SMEs' access to debt finance as following. First, this is one of the few papers that empirically examines SMEs' expectations of access to debt finance in times of uncertainty. So far only Brown et al. (2019) has examined the potential impact of the Brexit referendum on SMEs, but does not consider the expectations of access to debt finance. In addition, only a few studies have investigated the determinants of perceived access to bank debt and non-bank debt at the firm level and at the country level (e.g., Canton et al., 2013). **Other studies (e.g. Beck and Demircuc-Kunt, 2006; Cowling et al., 2012; Cowling et al., 2015; Lee et al., 2015; Bartz and Winkler, 2016) provide evidence that SMEs face less access to formal sources of external finance during periods of financial turmoil/**

uncertainty. We complement and extend these works in several directions. Specifically, we focus on the factors that can affect SMEs' expectations of access to debt finance, such as prior relationship lending, debt type (both bank debt and non-bank debt), and firms' opacity (including size, innovation and accounting information disclosure). In addition, we analyse the association between expectation of being financially constrained, expectation of growing less, and changing strategies.

Second, we contribute to the literature on relationship lending by providing new evidence on SMEs' expectations in times of uncertainty. While an extensive body of literature shows that relationship lending exerts an impact on credit constraints in "normal" times (Dhingra et al., 2016), there is a scarcity of studies focusing on the impact of relationship lending during adverse times. **A few recent papers (e.g. Bolton et al. (2016); Sette and Gobbi (2015)) find that relationship lending allows SMEs to receive favourable continuation of lending terms in periods of financial uncertainty. Differently, we analyse the effect of relationship lending on SMEs' expectations of access to debt finance during these periods of uncertainty. This is important in order to address potential discouragement in applying for external funding.**

Some key limitations should be considered when interpreting these results. First, expectations do not necessarily reflect the real economical outcome of the Brexit referendum. Second, SMEs' expectations can change according to the progress of negotiations between the EU and the UK government. Nevertheless, our findings contribute to the debate of access to debt finance in times of uncertainty and provide relevant policy considerations.

Specifically, policies aimed at reducing uncertainty and increasing the demand and supply of finance for SMEs could ameliorate some of the negative consequences that Brexit may have for the UK economy, such as the reduction of the EU funding to UK SMEs, access to the Single Market, and increased costs for EU supply chains. The UK government is trying to tackle some of these challenges. For example, it is committed to provide funding to offset the decline of EU funds, such as the UK Shared Prosperity Fund (Tinker, 2018). The results of this paper can provide suggestions to policy makers on how to efficiently allocate these funds. For example, to be effective, the UK government could specifically target SMEs that it believes are more vulnerable during periods of economic downturn, such as firms dealing with product innovation, in order to prevent them from decreasing their investments and renouncing any application for funds.

Another way to reduce uncertainty could be the implementation of contingency plans to avoid a credit crunch for British SMEs¹⁷. One possibility is to enhance capital allowances for small businesses that will be heavily affected by the Brexit referendum (Bailey and De Propris, 2017).

Finally, the availability of alternative financial sources, such as equity investment, peer-to-peer lending and crowdfunding, compared to the traditional banking system could help to ameliorate concerns of innovative SMEs

¹⁷ See <https://www.ft.com/content/69aa275e-2bbe-11e9-88a4-c32129756dd8>.

about future access to debt finance (Scholz, 2015). This could be important as a tight firm-bank relationship is apparently not effective in mitigating the innovative SMEs' concerns about future access to debt finance. However, alternative financial sources are still not fully available to SMEs located outside of London (Wood and Budhwar, 2017). Therefore, this could be a possible area of intervention for policy makers. Overall, without the co-presence and network of various financial players and channels, SMEs, and particularly innovative ones, could be more discouraged from applying for financial sources as they are more pessimistic about their successful chances of being granted debt financial sources.

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Table 1: Distribution of SMEs' responses to the Brexit referendum

This table presents the distribution of the responses to the Brexit referendum-related questions. Panel A describes the distribution of responses on the expected impact on access to debt finance following the Brexit referendum. Panel B summarises the distribution of responses on the expected impact on business growth after the Brexit referendum. Panel C presents firms' responses on cutting employment following the Brexit referendum. Panel D presents firms' responses on changing their business strategies following the Brexit referendum.

Panel A: Expected impact of the Brexit referendum on access to debt finance (in %)	
A lot easier	1.52
A bit easier	5.97
No impact	40.91
A bit more difficult	38.07
A lot more difficult	13.54
Obs.	1,056
Panel B: Expected impact of the Brexit referendum on growth (in %)	
Expect to grow less	28.61
Not expect to grow less	71.39
Obs.	989
Panel C: Employment cut (in %)	
Already cut employment	3.91
Not employment cut	96.09
Obs.	997
Panel D: Strategy changes (in %)	
Already change business strategies	13.64
No business strategies changes	86.36
Obs.	1,056

Table 2: Summary statistics

This table presents the summary statistics of the firm level characteristics. Columns 1 and 2 reports the cross-sectional average and standard deviation of each variable, respectively. Column 3 reports the sample size. Variable definitions are reported in Table A1 of the Appendix.

	Firm level characteristics		
	Mean	S.D.	Obs
Start up	0.010	0.102	1,056
Age 10yrs	0.163	0.369	1,056
Age 20yrs	0.454	0.498	1,056
Small size	0.206	0.405	1,056
Medium size	0.128	0.334	1,056
Export-oriented	0.247	0.432	1,056
Turnover (\leq £50K)	0.204	0.403	1,056
Turnover (\leq £1M)	0.090	0.286	1,056
Turnover (\leq £50M)	0.057	0.232	1,056
General access to bank finance	3.739	1.075	1,056
Relationship lending	0.183	0.387	1,056
Confidence	0.634	0.482	1,056
Awareness	0.624	0.256	1,056
Innovative	0.490	0.500	1,056
Business plan	0.450	0.498	1,056
Accounting info	0.634	0.482	1,056
Accountant	0.773	0.419	1,056

Table 3: Correlation matrix

This table presents the correlation matrix of the independent variables. Variable definitions are reported in Table A1 of the Appendix.

	New	10yrs	20yrs	Small	Median	Export	≤ £50K	≤ £1M	≤ £50M	Acc. to fin.	Rel. led.	Conf.	Aware.	Inno.	Bus. pl.	Acc. in.	Acc.
Start up	1																
Age 10yrs	-0.045	1															
Age 20yrs	-0.094	-0.402	1														
Small size	-0.052	-0.041	0.113	1													
Medium size	-0.039	-0.115	0.215	-0.195	1												
Export-oriented	-0.037	-0.063	0.042	0.050	0.142	1											
Turnover (≤ £50K)	0.088	0.051	-0.140	-0.235	-0.173	-0.197	1										
Turnover (≤ £1M)	-0.032	0.041	0.013	0.175-0.091	0.073	-0.159	1										
Turnover (≤ £50M)	-0.025	-0.075	0.146	-0.054	0.531	0.144	-0.124	-0.077	1								
General access to bank finance	-0.010	0.041	-0.074	-0.055	-0.076	0.025	0.042	-0.007	-0.070	1							
Relationship lending	-0.000	-0.016	0.052	0.019	0.046	0.036	-0.051	-0.029	0.032	0.008	1						
Confidence	-0.058	0.037	0.012	0.071	0.132	0.043	-0.129	0.012	0.101	-0.106	-0.074	1					
Awareness	-0.075	0.023	0.050	0.040	0.209	0.181	-0.180	0.003	0.152	0.057	-0.010	0.294	1				
Innovative	0.012	0.066	-0.074	0.081	0.034	0.251	-0.124	0.116	-0.028	0.078	-0.027	0.063	0.126	1			
Business plan	0.001	-0.028	0.014	0.193	0.224	0.100	-0.216	0.075	0.148	-0.003	0.090	0.089	0.164	0.204	1		
Accounting info	-0.019	-0.048	0.057	0.237	0.250	0.176	-0.372	0.067	0.144	-0.041	0.039	0.137	0.207	0.163	0.427	1	
Accountant	-0.078	-0.024	0.068	0.154	0.147	0.143	-0.259	0.068	0.114	-0.006	0.028	0.090	0.100	0.124	0.272	0.300	1

Table 4: Changes in the expectation of accessing debt finance

This table reports the number of firms that changed their beliefs related to the difficulties of accessing debt finance after the Brexit referendum. For this scope, we consider the SMEs' answers to two questions related to the difficulties of accessing external finance: i) in general (horizontal axis) and ii) after the Brexit referendum (vertical axis). The scale of difficulties in getting access to debt finance encompasses five categories, with 1 being "A lot easier" and 5 being "A lot more difficult".

After the Brexit referendum	Expected access to debt finance in general					Total
	1	2	3	4	5	
1	11	5	3	1	1	21
2	74	59	10	10	7	160
3	47	80	27	8	2	164
4	122	196	43	40	22	423
5	84	90	43	39	22	278
Total	338	430	126	98	54	1,046

Table 5: SMEs' expected access to debt finance

This table examines the characteristics of SMEs and their impact on the expectation of obtaining debt finance after the Brexit referendum. The dependent variables for all Columns are the expected scale of difficulty in obtaining debt finance after the Brexit referendum. Columns 1, 2 and 5 consider the full sample. Column 3 considers the sample of SMEs that received bank debt three years before the Brexit referendum. Column 4 considers the sample of SMEs that received non-bank debt three years before the Brexit referendum. Variable definitions are provided in Table A1 of the Appendix. The standard errors are in parentheses and are clustered at the sector level. Statistical significance of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Dependent variable:	Difficulty in accessing to debt finance				
	1: All sample	2: All sample	3: Bank_debt=1	4: Bank_debt=0	5: All sample
Relationship lending	-0.142* (0.08)	-0.147* (0.08)	-0.212* (0.12)	-0.199 (0.22)	-0.177*** (0.07)
Confidence	-0.183*** (0.07)	-0.184*** (0.06)	-0.213 (0.16)	-0.068 (0.14)	-0.200*** (0.06)
Innovative	0.182** (0.08)	0.183** (0.08)	0.190 (0.20)	0.143 (0.10)	0.158* (0.10)
Awareness			-0.041 (0.33)	-0.795** (0.35)	
Start up	-0.267 (0.31)	-0.253 (0.37)	0.214 (0.48)	-0.412 (0.35)	-0.212 (0.31)
Age 10yrs	-0.223 (0.15)	-0.222 (0.15)	-0.112 (0.18)	-0.323 (0.32)	(-0.219) (0.15)
Age 20yrs	-0.137*** (0.05)	-0.123** (0.06)	-0.251 (0.26)	0.034 (0.15)	-0.110* (0.06)
Small size	0.242*** (0.06)	0.224*** (0.05)	0.328*** (0.12)	0.072 (0.16)	0.171 (0.11)
Medium size	-0.018 (0.16)	-0.060 (0.18)	-0.003 (0.25)	-0.150 (0.26)	-0.116 (0.23)
Export-oriented	-0.090** (0.04)	-0.077*** (0.03)	-0.126 (0.16)	0.052 (0.13)	-0.083** (0.04)
Turnover (\leq £50K)	0.104 (0.14)	0.096 (0.14)	0.126 (0.37)	0.046 (0.15)	0.136 (0.17)
Turnover (\leq £1M)	0.225 (0.37)	0.212 (0.40)	0.078 (0.56)	0.365 (0.47)	0.181 (0.40)
Turnover (\leq £50M)	0.135 (0.36)	0.122 (0.35)	0.290 (0.46)	-0.378 (0.55)	0.083 (0.36)
General access to bank finance	0.320*** (0.05)	0.311*** (0.05)	0.258*** (0.10)	0.376*** (0.06)	0.306*** (0.05)
Business plan					0.234* (0.09)
Accounting info					-0.185* (0.10)
Accountant					0.301 (0.21)
Sector FE	Yes	Yes	Yes	Yes	Yes
Region FE	No	Yes	Yes	Yes	Ye
Pseudo R^2 (%)	2.17	2.39	2.58	3.27	2.70
Obs	1,056	1,056	501	555	1,056

Table 6: Process and product innovation

This table examines the characteristics of SMEs and their impact on the expectation of obtaining debt finance after the Brexit referendum. The dependent variables for all Columns are the expected scale of difficulty in obtaining debt finance after the Brexit referendum. The estimations for all Columns are based on the full sample. Variable definitions are provided in Table A1 of the Appendix. The standard errors are in parentheses and are clustered at the sector level. Statistical significance of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Dependent variable:	Difficulty in accessing debt finance				
	1: All sample	2: All sample	3: All sample	4: All sample	5: All sample
Relationship lending	-0.149** (0.07)	-0.154** (0.08)	-0.150** (0.07)	-0.065 (0.06)	-0.216*** (0.06)
Product innovation	0.107*** (0.03)		0.088** (0.04)	0.155** (0.06)	
Process innovation		0.122 (0.10)	0.063 (0.09)		0.083 (0.10)
Relationship lending × Product innovation				-0.259 (0.25)	
Relationship lending × Process innovation					0.197 (0.18)
Confidence	-0.181*** (0.06)	-0.180*** (0.06)	-0.206*** (0.06)	-0.186*** (0.06)	-0.178*** (0.06)
Start up	-0.230 (0.36)	-0.263 (0.36)	-0.190 (0.36)	-0.216 (0.36)	-0.261 (0.36)
Age 10yrs	-0.215 (0.14)	-0.211 (0.15)	-0.205 (0.14)	-0.217 (0.14)	-0.215 (0.15)
Age 20yrs	-0.130** (0.06)	-0.131** (0.05)	-0.146** (0.06)	-0.132** (0.06)	-0.134** (0.05)
Small size	0.228*** (0.05)	0.229*** (0.05)	0.224*** (0.05)	0.219*** (0.06)	0.235*** (0.05)
Medium size	-0.046 (0.19)	-0.054 (0.18)	-0.041 (0.17)	-0.047 (0.19)	-0.048 (0.18)
Export-oriented	-0.060 (0.04)	-0.064 (0.04)	-0.069 (0.04)	-0.065 (0.05)	-0.058 (0.04)
Turnover (\leq £50K)	0.082 (0.14)	0.091 (0.14)	0.113 (0.15)	0.084 (0.13)	0.093 (0.14)
Turnover (\leq £1M)	0.234 (0.39)	0.231 (0.40)	0.240 (0.39)	0.228 (0.39)	0.231 (0.39)
Turnover (\leq £50M)	0.100 (0.37)	0.100 (0.36)	0.098 (0.36)	0.102 (0.36)	0.096 (0.37)
General access to bank finance	0.314*** (0.05)	0.316*** (0.05)	0.318*** (0.05)	0.314*** (0.05)	0.318*** (0.05)
Sector FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Pseudo R^2 (%)	2.34	2.34	2.35	2.36	2.36
Obs	1,056	1,056	1,056	1,056	1,056

Table 7: Robustness checks: Expected sales decrease and employment cut of the SMEs

This table examines the characteristics of SMEs and their impact on the expectation of obtaining debt finance after the Brexit referendum using a trivariate probit model. Columns 1, 2 and 3 consist of one system of equations with the dependent variables being expected difficulty of accessing debt finance after the Brexit referendum, expectation of growing less after the Brexit referendum, and employment cuts (in terms of employee numbers and amount of working hours, respectively. Columns 3, 4 and 5 consist of another system of equations with the dependent variables being expected difficulty of accessing debt finance after the Brexit referendum, expectation of growing less after the Brexit referendum, and changes of business strategies, respectively. Detailed variable definitions are provided in Table A1 of the Appendix. The standard errors are in parentheses and are clustered at the sector level. Statistical significance of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Dependent variable:	Financing_expectation	Growth_expectation	Employment cut	Financing_expectation	Growth_expectation	Strategy changes
Relationship lending	-0.158*** (0.06)	-0.141 (0.10)	-0.221 (0.22)	-0.156*** (0.06)	-0.089 (0.13)	-0.308** (0.15)
Confidence	-0.189** (0.02)	-0.174** (0.10)	0.042 (0.15)	-0.138*** (0.03)	-0.198** (0.10)	-0.139 (0.09)
Innovative	0.108*** (0.03)	0.230*** (0.08)	0.278*** (0.03)	0.112*** (0.03)	0.223** (0.10)	0.329*** (0.08)
Start up	-0.166 (0.31)	-0.188 (0.33)	0.612 (0.51)	-0.214 (0.30)	-0.219 (0.31)	0.207 (0.51)
Age 10yrs	-0.006 (0.11)	0.198** (0.08)	0.106* (0.06)	-0.033 (0.11)	0.154* (0.09)	0.048 (0.07)
Age 20yrs	-0.058 (0.11)	-0.079 (0.06)	0.038 (0.09)	-0.019 (0.10)	-0.074 (0.07)	-0.022 (0.11)
Small size	0.191*** (0.05)	-0.007 (0.15)	0.350*** (0.05)	0.148*** (0.05)	0.028 (0.12)	0.023 (0.10)
Medium size	0.045 (0.17)	0.007 (0.15)	0.377*** (0.15)	0.046 (0.16)	0.042 (0.14)	0.311 (0.21)
Export-oriented	-0.184*** (0.02)	0.255*** (0.09)	0.281*** (0.10)	-0.163*** (0.04)	0.230*** (0.09)	0.502*** (0.11)
Turnover (\leq £50K)	0.165*** (0.03)	0.009 (0.09)	-0.345 (0.30)	0.156*** (0.03)	-0.007 (0.11)	-0.269*** (0.10)
Turnover (\leq £1M)	0.236* (0.13)	0.010 (0.06)	0.103 (0.11)	0.278** (0.12)	0.040 (0.06)	-0.057 (0.22)
Turnover (\leq £50M)	0.177 (0.17)	0.279 (0.33)	-0.194 (0.24)	0.155 (0.18)	0.190 (0.31)	-0.173 (0.32)
General access to bank finance	0.178*** (0.04)	0.066** (0.03)	0.256*** (0.07)	0.186*** (0.03)	0.084*** (0.02)	0.183*** (0.02)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
$\rho_{v1,v2}$		0.301***			0.313***	
$\rho_{v1,v3}$		0.280***			0.287***	
$\rho_{v2,v3}$		0.708***			0.479***	
Obs		949			1,003	

Table A1: **Variable definitions**

This table presents the variable definitions.

Variables	Definition
Start up	Dummy variable taking value 1 if the firm's age is less than 1 year, and 0 otherwise.
Age 10yrs	Dummy variable taking value 1 if the firm's age is less than 10 years and older than 1 year, and 0 otherwise.
Age 20yrs	Dummy variable taking value 1 if the firm's age is less than 20 years and older than 10 years, and 0 otherwise.
Small size	Dummy variable taking value 1 if the number of the firm's employees is within the range of 10 to 49, and 0 otherwise.
Medium size	Dummy variable taking value 1 if the number of the firm's employees is within the range of 50 to 249, and 0 otherwise.
Export-oriented	Dummy variable taking value 1 if the firm has exported in the last three years, and 0 otherwise.
Turnover (\leq £50K)	Dummy variable taking value 1 if the firm's turnover is less than £50,000 in the past 12 months, and 0 otherwise.
Turnover (\leq £1M)	Dummy variable taking value 1 if the firm's turnover is less than £1 million and more than £50,000 in the past 12 months, and 0 otherwise.
Turnover (\geq 50M)	Dummy variable taking value 1 if the firm's turnover is more than £50 million and more than £1 million in the past 12 months, and 0 otherwise.
General access to bank finance	Categorical variable taking a scale from 1 to 5 with 1 being very easy to obtain bank finance in general and 5 being very difficult to obtain bank finance in general.
Relationship lending	Dummy variable taking value 1 if the firm has a long-standing relationship/trustful relationship with a main financial provider, and 0 otherwise.
Confidence	Dummy variable taking value 1 if the firm is confident to obtain external financing from different providers, and 0 otherwise.
Awareness	The ratio of the number of external finance options that a firm is aware of to the total number of financial options available.
Innovative	Dummy variable taking value 1 if the firm introduced new or significantly improved goods or services or introduced any new or significantly improved processes for producing or supplying goods or services over the last three years, and 0 otherwise.
Employment cut	Dummy variable taking value 1 if the firm decreased number of working hours of existing staff or made staff redundant or used staff on difference contract.
Business plan	Dummy variable taking value 1 if the firm has a formal written business plan, and 0 otherwise.
Accounting info	Dummy variable taking value 1 if the firm produces regular monthly or quarterly management accounts, and 0 otherwise.
Accountant	Dummy variable taking value 1 if the firm dedicates finance person that manages its accounts or compiles tax returns, and 0 otherwise.