Access to finance for clean tech innovation and investment:

Evidence from UK small- and medium- sized enterprises

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Abstract

Clean technology (cleantech) is becoming increasingly important as firms and industries seek to address challenges around the global scarcity of resources and also achieve wider social and environmental goals. Yet there are underlying problems with how capital markets respond to this increasing demand for new and innovative cleantech investments. In this paper we use a large UK data set to firstly consider the extent to which firms engaging with cleantech increase their demand for external capital. We then consider how different types of debt and equity financiers deal with this demand for funds. Our key findings are that (a) businesses engaging with clean technologies have a higher demand for external capital, and, (b) that these demands are not being fully met by traditional providers which forces firms to seek out alternative and non-traditional sources of finance.

Managerial Relevance

Whilst it is clear that businesses across all sectors of the economy are becoming increasingly engaged with the green agenda and expanding their investment in clean technologies, it is evident that traditional debt and equity providers are wary of these new forms of investment in new and innovative technologies. This has very direct relevance for managers seeking to raise new capital to fund investments in clean technologies. We argue that managers seeking investment capital should look beyond traditional providers of finance and explore alternative sources by taking the opportunity to engage with the expanding FinTech industry. In addition, they might also benefit from exploring the myriad of finance schemes offered by public agencies to support the broader green agenda.

1. Introduction

The growth of high-tech industries is a well-established driver of economic growth as outlined in the endogenous growth literature where growth is driven by technological change (Aghion and Howitt, 1992; Romer, 1990). Here the birth and growth of high-tech industries, defined as a distinct group of industries with high R&D intensity and significant employment of scientific talent within a set of technologies (Bakhshi et al, 2015; European Commission, 2020; OECD, 2012), are fundamentally driven by technological innovation (Liu and Buck, 2007; Malerba and Orsenigo, 1995). Clean technology (cleantech) is an increasingly important agenda of innovation in this context as firms and industries seek to address challenges around the global scarcity of resources, but also achieve wider social and environmental goals (Colombo et al, 2016; Mrkajic et al, 2019; OECD, 2009).

Finance is one of the key determinants of successful innovation, especially for resource-constrained small- and medium-sized enterprises (SMEs). With limited internal funds to meet the firm's investment needs (Vanacker and Manigart, 2010), SMEs usually have to rely on the external credit market to fund potentially viable investment opportunities (Gelos and Werner 2002; Laeven 2003; Love, 2003). Whilst younger and smaller firms in general face problems in external capital markets (Cosh et al, 2009; Fairlie and Robb 2007; Fraser, 2014; Levenson and Willard 2000; Shen 2002), these more general capital constraints are exacerbated

and magnified in innovative and technology-based firms (Boekholt, 1996; Freel, 2007; Mina et al, 2013), and in particular during an economic downturn (Lee et al, 2015; Paunov, 2012). Their heavy reliance on intangible assets results in the lack of physical assets that can be placed as security against lending (Coco, 2000; Cowling, 1999). Such market imperfection is also related to a wider lack of information transparency and the potential for agency problems between firms and finance providers.

However, while previous empirical studies have documented abundant evidence of credit rationing for SMEs in general, there is little thorough investigation into the access to finance for cleantech businesses (Mrkajic et al, 2019; Owen et al, 2018). This is surprising since it is widely recognised that finance is essential for but also a major barrier to green innovation and sustainable growth (Cecere et al, 2018; Ghisetti et al, 2015; Horbach, 2008; Rizos et al, 2016), which have recently become policy agenda priorities around the globe. Compared to large companies, which have more incentive on, and are more capable of, cleantech investment to achieve higher environmental efficiency, SMEs are more reluctant to commit their scarce resources to green innovation (Del Brio and Junquera, 2003; Revell et al, 2010). Besides the common issues around the credit rationing of technology based small firms, SMEs undertaking cleantech investments may face wider funding gaps due to their large capital requirement, lengthy investment horizon and high levels of risk/uncertainty (Criscuolo and Menon, 2015; Owen et al, 2018; Rizos et al, 2016). In this sense, even the more risk-tolerant equity investors such as venture capitalists (VCs) and business angels may find the returns to investing in green innovative SMEs too low to justify the inherent technological risks (Parris and Demirel, 2010), not to mention commercial banks (Plozin, 2017). Therefore, government interventions usually play a key role in addressing environmental externalities and supporting cleantech innovations (Cecere and Corrocher, 2018; Magnusson and Berggren, 2018; Polzin, 2017). However, this inevitably raises the question on whether or not public initiatives are efficiently designed so as to complement, not crowd out, or displace private-sector investments (Cecere et al, 2018; Colombo et al, 2016; Owen et al, 2018).

In this paper, we aim to tackle the question as to whether SMEs do indeed face greater constraints when seeking to access capital from external markets to fund cleantech investments, and if so, whether such constraints are magnified for firms in the high-tech industry sectors. Using a large-scale survey data set that

covers UK SMEs between 2007 and 2012, we investigate SMEs' decision to apply for, i.e. the demand for external finance, as well as the outcome of their applications, i.e. the supply of external finance. We perform a series of econometric analysis while controlling for firm/owner characteristics and potential selection biases where applicable, not only on access to finance in general, but also for different types of external finance, from both the private and public sector.

Our results suggest that going-green SMEs – those introducing environmental-friendly measures to their businesses – have a higher demand for external capital, especially for firms that are seeking to increase their investment in cleantech in the future. Regarding the types of finance sought, going-green SMEs have a higher preference for non-traditional sources of funding, primarily direct government subsidies or government-guaranteed loans, with a particular dislike for bank debt. However, we also find that for high-tech firms introducing clean technologies, they are more likely to avoid seeking finance from the external capital market. On the supply side, we find that whilst in general financiers are happy to finance cleantech investments *per se*, there appears to be a particular problem around cleantech investments in high-tech industries. Such funding gap is more pronounced in the private-sector capital market, namely bank loans and equity, implying that public fund may have displaced existing private investment in green high-tech firms.

This paper makes a number of contributions both to the literature on access to finance for small businesses, and the ongoing debate on financing early-stage green innovation. To our knowledge, our study is among the first to empirically examine the determinants of external finance demand and supply for going-green SMEs, both within and outside high-tech industries. Secondly, we are able to consider the full spectrum of external finance sources for SMEs. This includes both private- and public-sector financiers, and beyond equity instruments which is commonly the focus of high-tech finance literature (North et al, 2013). Including public funding in our analysis also allows us to draw preliminary insights into the interplay of public intervention and private investment. Thirdly, we are able to take a more finely grained view of capital rationing by considering both absolute rationing, where no finance was obtained, and partial rationing, where some, but not all of the finance sought was obtained. To this end, we are able to establish the level of difficulty a firm had in the process from making an initial application for finance to receiving a final acceptance or rejection.

The rest of the paper is organised as follows; In Section 2 we review the theory and empirical evidence relating to the demand for and supply of external capital, and consider the uniqueness of the green and high-tech firm context. In Section 3 we discuss our empirical data and methodology. Section 4 presents our descriptive statistics and econometric modelling. We conclude in Section 5 with a discussion of our key findings and their implications for cleantech firms and firms operating in high-tech industry sectors.

2. Theory and Hypotheses

Credit rationing, particularly in the context of SMEs and the banking sector, has been the focus of a significant body of theoretical work, and its existence has been examined extensively in a burgeoning body of empirical work (Berger and Udell, 1992 and 1998; Hall and Lerner, 2010). The consistent theme that links this literature together is the role that asymmetric information plays in the firm-bank relationship (Behr and Guttler, 2007; Berger and Udell, 1998; Petersen and Rajan, 1994). Adverse selection and moral hazard resulted from asymmetric information between firms and financiers lead to a supply of investment capital below the social optimum (de Meza and Southey, 1996; Stiglitz and Weiss, 1981 and 1983). This supply-side 'funding gap' has been widely used to justify government intervention to increase lending and loan supply to smaller firms, albeit sometimes regardless of the creditworthiness of borrowers (Cressy, 1997; De Meza and Webb, 2000; Nightingale et al, 2009; Fraser et al, 2015). This perceived financing constraint is seen as particularly acute for high-tech, innovative SMEs (Colombo and Grilli, 2007; Freel, 2007). However, fairly limited attention is paid to the financing constraints of going-green SMEs, defined as businesses that take measures to reduce their environmental impacts, not to mention high-tech going-green SMEs (Mrkajic et al, 2019; Demirel and Parris, 2015).

In this section, we draw on the extant literature on both the demand for and supply of external finance for SMEs especially innovative and technology-based firms, and discuss whether the introduction or adoption of green technologies may or may not change the traditional wisdom on the matter.

2.1. Credit demand

It is reasonable to believe that the assumptions underlying the Modigliani-Miller (1958) proposition of capital structure irrelevancy do not hold for high-tech SMEs in light of high information asymmetry and large bankruptcy and other transaction costs (Hall and Lerner, 2010; Revest and Sapio, 2012). Since external finance is not costless, firms with financing needs will primarily look into internal sources of funds and only turn to external sources when internally generated funds cannot satisfy the firm's capital requirement (Myers, 1984; Myers and Majluf, 1984). The pecking-order theory (Myers, 1984; Myers and Majluf, 1984) based on the information asymmetry between external investors and firm managers, is the most commonly used framework to understand SMEs' financing decision. It argues that when external finance is needed, debt is preferred to equity because new equity issues would dilute shareholders' ownership of the firm and could be taken by potential investors as a signal that the existing stock is overvalued (Asquith and Mullins, 1986; Eckbo, 1986; Dierkens, 1991; Shyam-Sunder, 1991). Accordingly, commercial (high street) bank loans is the most common source of external funding (Colombo and Grilli, 2007; de Bettignies and Brander, 2007) used by SMEs.

For SMEs to develop cleantech projects, external finance is even more crucial, because of their intense capital requirement and long investment horizon (Demirel and Parris, 2015; Ghisetti et al, 2017; Cecere and Corrocher, 2018). Compared to non-cleantech investments, environmental innovation is subject to 'double externality' – spillover effects in both the introduction and diffusion phases (Rennings, 2000; Cecere et al, 2014). As a result, the social return to eco-innovation tends to be higher than the economic return, lowering SMEs' incentive to initiate cleantech projects if no external funding is available. Moreover, the substantial costs associated with green innovation are usually unrecoverable (Cortazar et al, 1998) and this, coupled with regulatory uncertainty of environmental policies (Grubb et al, 2014), make it difficult evaluated the risk-adjusted return of such projects. For these reasons, SMEs are reluctant to commit their scarce resource to invest in cleantech, unless through external financing channels.

Despite their credit-worthiness, some firms with a latent demand for credit choose not to apply because the cost of application is too high (Kon and Storey, 2003). As a result of the very expectation of credit rationing, firms maybe self-select out of the credit market based on their perception of the true credit supply. Depending on the informational opaqueness between firms and outside financiers, such perception is affected by the

riskiness of the firm (Cole and Sololyk, 2016; Han et al, 2009), entrepreneurial human capital (Kon and Storey, 2003), and firm-bank relationships (Chakravarty and Yilmazer, 2009; Berger and Black, 2011). Thus the considerably higher risks inherent in high-tech companies are likely to *a priori* lead to higher discouragement (Hutton and Nightingale, 2011). The likelihood of discouragement may increase further for high-tech firms investing in green technologies, because of the idiosyncratic risks associated with eco-innovation.

However, for high-tech SMEs, the high default probability they have (Westhead and Storey, 1997; Revest and Sapio, 2012) suggests that they may not be able to afford high-leverage finance (Myers, 1984) and equity usually becomes the last resort when external financing needs are present. Such financing cost comes not only from the highly uncertain return and notorious information asymmetry of high-tech businesses (Freel, 2007; Hall and Lerner, 2010), but equally importantly, lack of tangible assets as collateral required by banks (Denis, 2004). Going-green SMEs, on the other hand, are reported to rely heavily on government support (Bürer and Wüstenhagen 2009; Criscuolo and Menon 2015). This is partly due to the double externality problem discussed earlier, which makes the role of policy instruments vital in "putting a market value on the environmental benefits (Cecere et al, 2018)", also known as the "regulatory push-pull" effect (Rennings, 2000). Based on the above discussion, we propose the following hypotheses:

H1: SMEs embracing clean-technologies are more likely to seek external finance.

H2: SMEs embracing clean-technologies are likely to have a higher demand for alternative forms (non-debt and non-equity) of external finance from the public sector.

2.2. Credit supply

In their seminal work on small business finance, Berger and Udell (1998) conceptualise the supply of capital as a dynamic process which changes given SMEs' needs and options, as well as the degree of information opacity between firms and fund suppliers. However, not all SMEs that apply for external credit are successful (Levenson and Willard, 2000; Shen, 2002; Fairlie and Robb, 2007; Cowling et al, 2012). This occurs for many reasons including lack of asset cover (Coco, 2000), poor information flows (Diamond, 1984; Myers, 1984; Myers and Majluf, 1984), lack of investment readiness (Mason and Harrison, 2003), and

exogenous factors such as unfavourable economic conditions (Lee et al, 2015) and regional inequality (Cowling and Lee, 2019; Cowling, Lee and Ughetto, 2020). The issue of 'unfair' credit rationing, that is not based on borrower quality (Stiglitz and Weiss, 1981), has been the focus of a large volume of literature (Cowling and Mitchell, 2003; Fraser, 2009), and has been used to justify government intervention such as loan guarantee programmes (Cowling and Clay, 1994; Cowling, 2010; Cowling and Siepel, 2013; Cowling, Ughetto and Lee, 2017; Ughetto, Scellato and Cowling, 2017; Riding, 1997).

High-tech SMEs are likely to encounter more severe financing constraints than average SMEs (Carpenter and Petersen, 2002; Cowling, Ughetto and Lee, 2017; Scellato and Ughetto, 2010; Westhead and Storey, 1997), and especially when capital requirements are based on intended innovations (Freel, 2007; Hain and Christensen, 2013; Stiglitz, 1993; Ughetto, 2008 and 2009). A number of reasons are commonly proposed to explain high-tech SMEs' disadvantages in credit markets. First, high-tech SMEs usually have higher idiosyncratic risks given the high uncertainty of innovation and R&D (Westhead and Storey, 1997; Mina et al, 2013), as well as higher transaction costs related to external financing (Story, 1994). This in conjunction with the lack of scale economies (Berger and Udell, 1998; Cassar, 2004) mean that the investment returns for high-tech SMEs are significantly and negatively skewed (Coad and Rao, 2008). Second, information asymmetry between investors and firms is likely to be more profound for high-tech SMEs. On the one hand, the high novelty of their products/services and lack of track record make it more difficult for investors to evaluate *ex ante* the quality of the projects and in turn investors will charge a higher risk premium, which can be prohibitively expensive for some firms (Akerlof, 1970; Stiglitz and Weiss, 1981; Hall and Lerner, 2010). On the other hand, asymmetric information may pose further difficulties for investors to monitor *ex post* the behaviour of high-tech entrepreneurs. As such, investors may require physical assets as collateral to secure their investment but for high-tech SMEs whose value rely heavily on growth opportunities, their intangible and highly firm-specific assets have little collateral value (Colombo and Grilli, 2007; Mina et al, 2013; Revest and Sapio, 2012). Third, the founders of high-tech SMEs are usually scientists with insufficient managerial and entrepreneurial skills (Westhead and Storey, 1997). In this sense, high-tech SMEs may only be attractive for a few highly specialised investors such as venture capitalists (Colombo and Grilli, 2007).

The UK Government is known for its commitment to supporting investment in eco-innovation, compared to its developed country counterparts (Cosh and Hughes, 2010; Mason and Pierrakis, 2013), although usually at a considerably smaller scale (Owen and Mason, 2017). In a recent study by Criscuolo and CarloMenon (2015), UK is found to be the most attractive country for green sector VC investors in terms of the ratio of companies receiving funding to those seeking funding. Therefore, it is expected that going-green SMEs are likely to have at least part of their financing needs satisfied through government supports. Environmental friendly firms may also appeal to financiers through better access to certain market (e.g. green public purchasing), differentiating products and improved risk/cost management (Ambec and Lanoie, 2008).

However, compared to low-tech or traditional high-tech ventures, high-tech companies that (consistently) use clean technologies are not only subject to financing constraints typical for high-tech firms, but also specific barriers linked to insufficient green finance. First, the commercialisation and market acceptance of green technologies are still questionable given its technological complexity (Amore and Bennedsen, 2016), lengthy investment horizon (Owen and Mason, 2016), high capital requirement and lack of successful exit track record (Petkova et al, 2014). This exacerbates the information asymmetry between the firm and the financier as the common criteria in evaluating the credit-worthiness of the company may no longer be relevant. For example, Owen and Mason (2016) noted that it is particularly difficult for the UK Government Angel Co-investment Fund to raise large-scale follow-on funds for UK green businesses. Second, companies may have adopted clean technologies under regulatory pressures, which introduces further uncertainty as the success of investment not only depends on technological viability but also regulatory volatility or political will (Bürer and Wüstenhagen, 2009; Demirel and Parris, 2015; Petkova et al, 2014). Third, on the supply-side, there is insufficient data to provide a clear understanding of the idiosyncratic financing needs, or potential funding opportunities, of green innovators (McDaniels and Robins, 2017). This lack of awareness gives rise to an insufficient diversity of both financial products and institutions tailored for sustainable and green investments in SMEs. Based on the above discussion, we propose the following hypotheses:

H3: SMEs embracing clean-technologies are less likely to experience full credit rationing, i.e. no external finance from any sources.

Although leverage may improve firms' efficiency in utilising free cash flows and thus reduce the agency costs (Jensen, 1986), banks would prefer to invest in more established businesses with more collateralised assets than high-tech SMEs for the afore-mentioned reasons (Carpenter and Peterson, 2002; Hall and Lerner, 2010), and given their use of standardised credit scoring techniques (Cressy, 2002; North et al, 2013; Fraser, 2014). Moreover, the requirement of stable cash flows to service debt makes bank loans less accessible for R&D intensive, high-tech firms (Hall and Lerner, 2010). The same argument applies to going-green SMEs, especially early-stage businesses (Plozin, 2017). Equity investors such as VCs and business angels are thus more suitable for high-tech and going-green SMEs because they avoid the afore-mentioned problems (Colombo and Grilli, 2007). These investors are specialised in early-stage, high-tech investment whilst providing the necessary managerial skills and monitoring to investees (Gompers and Lerner, 2004).

For VC firms especially those reputable ones wishing to meet the high return expectations of limited partners, they are more motivated to invest in emerging sectors such as cleantech, in the hope to discover "the next big thing" (Petkova et al, 2014). However, the same pressure to maintain reputation means most VCs are reluctant to get involved in low-quality or high-risk projects, such as early-stage technology investments given their low risk-adjusted returns and have gradually shifted towards later-stage, private-equity investments (Abrardi, Croce and Ughetto, 2019; Lockett et al, 2002; Nightingale et al, 2009; Rowlands, 2009), unless VCs are able to benefit from an investee's growth trajectory through long-term involvement (Lange, Lee and Dai, 2011; Lee, Pollock and Jin, 2011). To reconcile the need of both risk-taking and risk control, Petkova et al (2014) suggest that VC firms need certain degree of legitimation to justify their investment in the emerging sector, one of which is regulatory approval (Sine et al, 2007). We argue that continuous commitment to cleantech investment, usually endorsed (or required) by the government, provides such legitimation and thus would attract more investment from VCs. However, the 'attractiveness' of green projects can be reduced for excessively high-risk investments, such as cleantech investments in high-tech industries. On this ground, we formulate the following hypothesis:

H4: Equity financiers are more likely to fund SMEs committed to long-term investment in clean technologies.

3. Data and Methodology

3.1. The UK Small Business Survey

This study is intended to analyse existing data from three consecutive (2007/08, 2010 and 2012) UK Small Business Surveys (SBS). Commissioned by the Department for Business, Innovation and Skills (BIS), the SBS is a large-scale telephone survey on UK SMEs on a biannual basis. The main purpose of the survey is to "monitor key enterprise indicators and how these have changed in comparison to previous surveys" and "to gauge SME intentions, needs, concerns and the obstacles to fulfilling their potential" (BIS, 2010). In each of the three sample SBS waves, over 4,000 SMEs (businesses with fewer than 250 employees) were interviewed using a stratified random sample selection method evenly across thirteen regions in the UK and a quota sample was drawn by employment size. Data were then weighted by sector within employment size within nation according to BIS's Business Population Estimates targets in order to make it representative of the UK SME population. As a result, larger SMEs are over-sampled compared to their natural representation in the SME population, in order to generate robust sub-samples; and fewer interviews were conducted with 0 employee businesses to allow for these extra interviews. For all firms across the three surveys, 36% are micro enterprises (1 to 9 employees), 34% are small enterprises (10 to 49 employees), 15% are medium enterprises (50 to 249 employees) and the remaining are self-employed businesses. The final group is removed from our analyses because their financing behaviours are likely to differ with employer SMEs. Accordingly, 9,894 observations remain in our sample after eliminating missing values.

3.2. Identifying SME credit demand and supply

Panel A of Table 1 shows the definition of dependent variables, which capture SMEs' demand for, and supply of, external finance. This study looks at both SME access to alternative sources of finance, and different degrees of credit rationing. Demand for finance (*SOUGHT*) is defined as whether the firm applied for external finance in the previous twelve months. We are also able to gather information on the types of finance requested by SMEs. The first two are the more traditional types of external finance, namely bank debt (mainly bank

loans, and overdraft facilities), equity (venture capital, private equity, business angel, etc.). A firm may also apply for other types of alternative finance, primarily government fund and government-guaranteed loans.

Supply of finance is measured by whether or not the firm obtained (all or part of) the finance required. A firm is defined as fully credit-rationed if it was unable to get any finance from any source (*RATION_FULL*), and this is a measure of 'absolute' rationing (Lee et al, 2015). A firm can also be partially credit-rationed by not receiving all the finance sought, or encounter indirect rationing in the form of search and application costs if it has to apply to multiple sources to secure the fund needed. Such firms fall into the following three categories, given its response on the question "Did you have difficulties obtaining this finance from the first source?":

A) Firms that had trouble getting finance from the first source;

B) Firms which did not get all the finance they needed from the first source;

C) Firms which did not get any finance from the first source.

The above three categories can overlap each other. Our final measure of credit supply concerns the financing difficulties with respect to different types of external finance (debt, equity and other).

3.3. Defining going-green SMEs and high-tech industries

Going-green SMEs were defined in Section 2 and as the response to the SBS question "has your business taken any steps to reduce the environmental impact it makes, such as reducing energy consumption, waste reduction or switching to recycled/sustainable materials". We also wish to examine the firm's long-term commitment to cleantech usage, which signals the riskiness of the business or serves as a form of legitimation for VC investment (Petkova, 2014). To do this, we compare a firm's current and future intention on cleantech usage. The latter is measured by whether the firm will do 'more than', 'as much as' or 'less than' it does currently to reduce its environmental impact in the future. According to the cross-tabulation of current and future cleantech usage, a firm falls within one of the five categories, namely no, new, increased, and sustained usage (Table 2).

However, the lack of consensus on the exact criteria means no ‘official’ classification exists for high-tech firms. Milkovich (1987) define high-technology firms as those that "emphasize invention and innovation in their business strategy, deploy a significant percentage of their financial resources to R&D, employ a relatively high percentage of scientists and engineers in their workforce, and compete in worldwide, short-life-cycle product markets". In turn, most studies define the scope for “high-tech” on the basis of R&D intensity and employment of scientific talent within a set of technologies and a distinct group of industries (Bakhshi et al 2015; OECD, 1997).

A widely accepted definition is by Butchart (1987) which identified high-tech sectors based on the 1980 Standard Industrial Classification (SIC). Although the Butchart definition was extended in later studies (e.g. Athreye, 2004), it is rather outdated. A more recent definition used by European countries is the Eurostat classification, which is based on R&D and knowledge intensity and covers both high-tech manufacturing and services industries. In this study, we adopt the classification by Bakhshi et al (2015). It combines the Eurostat classification with measures on the intensity of high-tech, knowledge-based workforce generate a classification of high–tech industries, which includes 47 sectors using the four-digit 2007 SIC. We then converted the classification into equivalent 2003 SIC used by SBS 2007/08 and 2010. Never the less, it should be noted that such industry-based definition ignores the variability of firms within a sector in adopting technologies, and may be biased towards larger firms because R&D inputs of small firms tend to be under-recorded (Geroski, 1990). In the subsequent empirical analyses, we did attempt alternative high-tech classifications such as the Butchart (1987) definition, but found no substantial difference in our primary findings.

3.4. Other control variables

The control variables can be classified into firm and owner characteristics. As discussed in the previous section, these variables are related to the development stage of the firm and the degree of information opacity between the firm and its finance suppliers, which have been shown to be significant in explaining the supply

of and demand for finance by prior studies. Panel B of Table 1 defines the explanatory variables by these four groups.

Firm characteristics include size, legal status, sector, region, firm age, and performance. Firm size is measured by employee numbers (*EMP*). Legal status is defined by three categories including sole proprietor, partnership and corporation. Age is banded into 'up to 10 years', '11 to 20 years' and 'more than 20 years'. Performance is measured as the percentage change in sales over the past twelve months (winsorised at 1% level) and whether or not the firm has made a profit over the period (*PROFIT*). Further, the sample covers small firms across the UK (in twelve regions) and five broad industrial sectors according to the SIC. We also control for the degree of internationalisation of a firm, using whether or not the firm export its products or services outside the UK (*EXPORT*).

Owner/entrepreneur characteristics measure the firm's human and social capital including owner age (*OAGE*), gender (*WLED*), education (*QUAL*) and measures on entrepreneurial growth orientation, defined as a dummy variable (*AIMGROW*) equal to 1 if the owner aims to grow the business in the next two to three years and 0 otherwise. Intentions to grow are especially relevant to the demand for external finance. On the one hand, firms are better off establishing credit relationships with outside financiers as early as possible in their life cycles in order to benefit from easier access and lower cost of future outside financing (Cassar, 2004), and thus such advantage is more likely to be obtained by more growth-oriented firms. On the other hand, in order to fulfil their ambitions, growth-orientated firms are more likely to seek alternative sources of finance than other firms.

[INSERT TABLE 1 HERE]

[INSERT TABLE 2 HERE]

4. Results

This section first reports the descriptive statistics for the dependent and independent variables, followed by the results from regression analyses. We estimate a series of binary probit models for SMEs' demand for and supply of finance. For the latter, we apply sample selection adjustment (Van de Ven and Van Pragg, 1981)

to take into account the obvious conditionality of the outcome of finance application, because these variables are only observed when the firm actually decided to apply for finance[1]. In particular, the first-stage, selection equation is identical to the respective demand-side model in Tables 3 and 4; then the second-stage, outcome equation examines different access to finance measures conditional on the sample being selected in the first stage. The exclusion restrictions used in the selection equation are twelve UK region indicators and entrepreneurial growth intention (*AIMGROW*)[2]. Standard model diagnostics are reported for each specification. Further, we also conducted additional tests on the exclusion restrictions to verify their exogeneity, i.e. validity, and that they are not weakly correlated to the first-stage selection equations (weak instruments). The details of the additional test and model diagnostics are available upon request. For all regression models, marginal effects of independent variables are reported next to the coefficient estimates, to show the economic significance of the variables alongside statistical significance.

4.1. Descriptive statistics

In additional to variable definitions, Table 1 reports the summary statistics of both dependent and independent variables after applying sample weights. Using the definition by Bakhshi et al (2015), 18% of the businesses are high-tech companies, whilst 74% of the firms fall into the category of going-green SMEs. There is limited comparable statistics on going-green SMEs, as most of the previous studies tend to focus on a subgroup of, rather than the whole small business sector[3]. The only study taking a generic approach we are aware of is Ghisetti et al (2015), where at a much smaller sample size, they report 46% of the sample European SMEs introduced 'environmental innovation' measures[4]. An 'average' SME in our data set is a family-owned, incorporated business with 18 employees, owned by a 50-year non-ethnic minority male who has a least one formal qualification. More than 80% of the firms made a profit over the past 12 months and the mean

[1] When the χ^2 tests of independence between selection and main equations cannot be rejected, we also run alternative, unconditional models as robustness checks. In all cases, our findings remain the same for alternative specifications. However, we report results with sample selection regardless, both for consistency considerations and because the model is theoretically justified. Results on alternative models are available upon request.

[2] Region indicators are widely used in similar studies as exclusion restrictions. Growth intention is by definition unobserved by external investors, and hence naturally an exogenous variable.

[3] For example, Demirel and Parris (2015) study the environmental sector, whilst Mrkajic et al (2019) look at green businesses in the high-tech sector.

[4] Even the Ghisetti et al (2015) study does not cover the full spectrum of industries.

percentage growth in sales is 2.5%. Further decomposing the sample firms by a cross-tabulation of current and future cleantech usage (Panel B, Table 2) shows that SMEs currently adopting cleantech and wishing to either increase (column 1) or maintain (column 2) cleantech usage are on average larger firms in high-growth, high-tech sectors. This suggests that continuing adoption of clean tech is a resource-intensive and risky activity, which is likely to be priced in when financiers make their investment decisions. From these basic descriptive statistics we can raise some public policy issues in the context of firms positioning and stance in relation to cleantech. We note that smaller firms are overly represented in the no usage – reducing usage – new usage categories which suggests that smaller firms should be a particular point of focus for any support programmes and the evidence supports the resource constraints argument which is often a prima facie justification for public intervention in markets. We find a similar over-representation of low-tech firms in these three categories which again suggests that the focus of public policy has been too orientated towards the green-tech revolution rather than a broader behavioural shift across the business population. Across industry sectors we are drawn to conclude that a significant driver of cleantech activity is related to compliance rather than a more deep rooted behavioural change. This means that firms are generally reactive rather than proactive. Again this could be changed through a focused public policy initiative.

During the sample period, 24% of SMEs had sought finance, amongst which 89% was debt finance, 2% equity-type finance and 11% other types of finance. 87% of SME finance applicants had met at least part of their financing needs from either first or other sources, so the remaining 13% were fully rationed of credit. For firms encountering partial credit rationing, 35% of applicants had trouble getting finance from the first source, 27% were not offered the full amount applied from the first source and 22% got no finance from the first source (amongst which 22 – 13 = 9% received some or all finance from other sources). Regarding different types of external finance, 32% of debt applicants, 35% of equity applicants and 53% of applicants for alternative finance reported difficulties when applying for respective types of finance[5].

4.2. Econometric analyses: credit demand

[5] The percentage is calculated, for example for debt, as mean(*DIFF_DEBT*) divided by mean(*SOUGHT_DEBT*), or 0.282/0.890 = 32%.

We examine SMEs' demand for external finance from two perspectives: the decision to apply for finance, and the types of finance applied. Table 3 reports the results for the likelihood of finance application. We estimate a set of two specifications: a benchmark specification on the individual effect of high-tech industries and the use of cleantech (Models 1A and 2A), and a further specification on the interaction between the two (Models 1B and 2B). For static cleantech indicator and cleantech usage dynamics alike, we find significant individual as well as interaction effect, so our discussion will be based on the specifications that include both effects.

Consistent with the pecking order theory, more profitable firms have lower credit demand due to their more sufficient internal fund sources. Our findings regarding firm and owner characteristics also conform with prior studies on entrepreneurial financing decisions (c.f. Cosh et al, 2015; Cowling et al, 2012 and 2016), that larger firms led by qualified and growth-oriented entrepreneurs are more likely to apply for finance, whilst businesses led by female entrepreneurs are more likely to be discouraged from the credit market.

High-tech SMEs have similar credit demand to low-tech SMEs in general, but going-green SMEs especially those forecasting an increasing usage of cleantech have significantly higher demand for external finance. Therefore, H1 is supported. In marginal terms, going-green SMEs are 5.6% ($\beta = 0.19$, $p < .01$), whilst firms currently using cleantech and with the intention to increase the usage are 6.2% ($\beta = 0.21$, $p < .01$) more likely to apply for finance. Moreover, a going-green SME in the high-tech sector is less likely to finance through the external capital market, by 10.6% ($\beta = -0.36$, $p < .01$) compared to an equivalent firm but in the low-tech sector. This signals the higher perceived financing costs by high-tech SMEs and thus higher likelihood of discouragement, even if a going-green SME has a latent demand for external finance.

[INSERT TABLE 3 HERE]

We further examine the choice of different types of external finance by SMEs, and the results are shown in Table 4. Models 1A and 1B present the findings from multinomial logit regressions (reference category = *SOUGHT_DEBT*). In order to compare the relative effect of a variable on the preference of a certain type of fund against debt finance, relative risk ratios are reported instead of point estimates. The characteristics of firms not seeking finance confirm our findings from the probit model. Compared to those applying for debt

finance, equity finance is more preferred by younger, non-family, growth-oriented and exporting businesses. The higher likelihood of partnership and incorporated businesses to apply for equity finance is supposed to be due to the legal form requirement of investees by venture capital or private equity investors. Interestingly, female-led businesses are more willing to apply for other types of finance primarily in the form of grants or government guaranteed loans, perhaps because female entrepreneurs are more likely to be the target for public support initiatives.

We document that high-tech SMEs can be up to ten times more likely to seek equity than debt finance (Model 1B). Going-green SMEs, on the other hand, have a higher preference over non-traditional finance by a factor of 1.9 compared to debt. Thus, H2 is also supported. Further, it still holds that the demand for external finance by going-green SMEs diminishes if the firm operates in the high-tech sector. To reinforce the evidence found, we further run three sets of probit models[6] on the likelihood of an SME finance applicant seeking a particular type of finance (Modes 2A to 4B). Both green and high-tech SMEs are more likely to seek finance from non-bank sources. Going-green SMEs show stronger preference over alternative types of finance, by 7% ($\beta = 0.44$, $p < .01$) compared to other firms, but such demand is primarily concentrated in low-tech businesses. Interestingly, high-tech firms are also 9% ($\beta = 0.58$, $p < .05$) more likely to apply for alternative types of finance, besides their 'natural' preference over equity. This is possibly due to the increasing availability of financing incentives targeting high-tech sectors by the UK Government.

[INSERT TABLE 4 HERE]

4.3. Econometric analyses: credit supply

Tables 5 and 6 present the regression results for credit supply, measured by various finance application outcomes. Table 5 reports the findings on difficulties in access to external finance in general using the four measures of credit rationing defined earlier. The selection equation is subsequently the likelihood of seeking external finance. For all sets of specifications but one, the chi-square tests of independent equations are

[6] We tested the potential existence of selection bias in a similar manner to the credit supply equations, and none was found for any type of finance considered.

rejected, indicating the existence of potential selection bias between credit supply and demand functions and verifying the use of the adjusted probit model.

The 'common knowledge' findings that larger and better performed firms are more likely to secure at least part of the fund required still hold in our study. There is no gender difference with respect to absolute rationing, but female-led businesses are still having more trouble satisfying their entire capital requirement, and from a single source of financiers. This finding echoes that from Cowling et al (2019), that although female entrepreneurs' *a priori* risk-aversion may be seen as a positive attribute by investors with ever decreasing risk tolerance, there is still evidence of 'softer' credit rationing against women.

This shifting risk preference towards higher risk-aversion by capital providers is further illustrated by our headline findings on green businesses. Consistent with H3, going-green SMEs generally have better access to finance, especially those expressing explicit future commitment to cleantech. The insignificant coefficient estimate on *HIGHTECH* suggests the non-existence of funding gap between high-tech and non-high-tech SMEs. This implies that being in the high-tech sector alone is not an indicator of the credit-worthiness of a firm. By comparing the business and owner characteristics, there is little evidence of structural difference, except that high-tech SMEs appear to grow faster than low-tech SMEs.

However, when an additional layer of uncertainty, in our case the adoption of cleantech, is introduced to a high-tech business, the likelihood of credit rationing would increase substantially. Compared to a low-tech, going-green SME, the odds of absolute rationing will increase by 12.2% ($\beta = 0.44$, $p < .1$) and the likelihood of financing difficulties from the first source will increase by more than a quarter. The effect is more prominent for high-tech firms committed to long-term, persistent cleantech usage. To some extent, firms may choose to reduce or terminate future cleantech usage, probably to signal to external financiers a more conservative risk attitude, in the hope to boost their chances of successful finance application.

[INSERT TABLE 5 HERE]

We report in Table 6 the existence of potential credit rationing for three alternative forms of external finance: debt, equity and others. Here, for each specification the selection equation is a probit model on the likelihood of a firm applying for the respective form of finance, except for equity (Models 2A and 2B) where

unconditional probit model is used due to the extremely small sample of equity applicants, which prohibits the convergence of the maximum likelihood function of the conditional model.

The determinants of access to debt finance are fairly similar to those of external finance in general. This is not only because the majority of SME finance applicants have sought debt finance, but also that banks are known to prefer low risk, low return investments, according to which they establish their lending criteria. Here firm size and growth performance are the two most important criteria to guarantee at least partial success in bank finance application. Going-green SMEs are slightly (4.5%) less likely to encounter financing difficulties in bank finance, but they are notably the more preferred investment by equity investors. Our analyses show that the odds of going-green SMEs being rejected are lowered by more than a half ($\beta = 2.66$, $p < .05$), although cautions should be taken when interpreting results based on the reduced sample size. This finding is consistent with the prediction by H4.

The financing gap identified in Table 5 for high-tech, going-green SMEs is not only found in the supply of equity finance as predicted by H4, but also the 'traditional' small business capital market as a whole, including bank finance. It is difficult to tell whether credit rationing is more severe in the debt or equity market, but there is limited evidence showing that high-tech businesses with increased intention to invest in clean technologies are particularly more likely to be disadvantaged by equity investors. What is more interesting is that such financing gap is significantly narrowed for other types of finance, as we find smaller differences among various types of SMEs regarding financing difficulties. On the one hand, it suggests that the supply of alternative finance, usually from the public sector, is determined by some external factors, such as policy or regulatory considerations, beyond the common risk assessment criteria. On the other hand, this could imply that public fund may have actually discouraged, or 'crowded out' private (debt and equity) investment to going-green SMEs in high-tech sectors, which is a warning sign for policy makers.

[INSERT TABLE 6 HERE]

Last but not least, it can be argued that SMEs decision to adopt clean technologies maybe endogenous, in the sense that a firm can take environmental friendly measures simply to 'fish' external finance especially government grants. For the first time, the 2012 SBS asked participating SMEs whether they introduce green

technologies "purely to comply with regulations, or have … taken additional steps which are above those required by regulations". This allows us to undertake the natural robustness check by focusing on the financing behaviour exclusively by those voluntary users of cleantech. First, it is worth noting that the majority of SMEs (76%) declared that they use cleantech beyond pure regulatory considerations. Next, we run the same credit demand and supply equations for the selected sample. As shown in Table 7, we find no qualitative differences from the earlier findings that use the full sample[7].

[INSERT TABLE 7 HERE]

5. Conclusions and policy implications

External finance is perceived as increasingly critical for SMEs to develop low carbon and eco-friendly innovations. In this paper, we have sought to understand the extent to which the access to external finance through different channels might differ for SMEs operating in high-tech industry sectors and for firms undertaking cleantech investments. To answer this question, we have used data from a large-scale survey of UK SMEs. Our results show that going-green SMEs, SEMs investing in clean technologies, have a higher demand for external finance, but they tend to rely more heavily on alternative sources—those represented by government-backed funding—to satisfy their external financing needs, with a particular dislike for bank finance. We find that such preference for external finance is lowered or even reversed in high-tech industries. On the supply-side of capital markets, commitment to cleantech investment particularly over a long-run is associated with a lower incidence of both absolute and partial rationing. However, there is a significant funding gap for high-tech SMEs that also wish to introduce environmental measures to their business. The gap is more acute for firms seeking finance from the private sector, namely bank debt and equity. Our findings are robust with respect to the motives of cleantech investment, when we exclude from our analyses firms that merely adopt green technologies to comply with government regulations.

The theoretical implications of our findings are multi-fold. Consistent with the demand-pull theory, going-green SMEs have limited potential, and willingness, to fund cleantech investments through internal

[7] There is no effect on either credit demand or supply for regulation compliers alone. Results not reported to save space, but available upon request.

sources because such investments are naturally associated with considerable externality, long investment horizon and low risk-adjusted return. Realising that the social benefit of eco-innovation is less likely to be incorporated in the pricing of financing products by private investors, going-green SMEs will have to rely heavily on funding opportunities from the public sector. This in turn, is a strong support for the "regulatory push-pull" effect that drives eco-innovation (Rennings, 2000).

Our results also suggest that being a going-green SME *per se* does not lead to credit rationing in general, which is not surprising given their highly targeted application strategies towards policy-oriented funding. Consistent with our predictions, equity financiers show greater tendency to channel their investment towards clean technology. This finding lends support to the theory that equity investors such as VCs, motivate their investment through constantly pursuing emerging opportunities, or the "next big thing" (Petkovaetal et al, 2014). Interestingly, we also find banks, which are believed to be more risk-averse, are also more likely to extend finance to going-green SMEs. This indicates a mismatch between credit demand and supply for going-green SMEs in the small business loan market. We show that whilst banks are able to make sensible lending decisions through common risk indicators such as size and financial performance, some credit-worthy going-green SMEs have self-selected out of the debt market. This finding contradicts that of Cowling et al (2016), that credit discouragement is an efficient self-rationing mechanism for low-quality borrowers.

Evidently, there is a widened funding gap for high-tech going-green SMEs in both debt and equity market, which accords to the classic credit rationing theory based on asymmetric information (cf. Stiglitz and Weiss, 1981; Berger and Udell, 1992). Facing with an additional layer of risk, investors are less able to evaluate the quality of the firm given their current information set, or find it too risky to justify the investment. Recall that the same type of firms is also less likely to apply for finance and if they were *indeed* of inferior quality, one could conclude that private investors are making the rational decisions, and discouragement an efficient self-rationing mechanism (Cowling et al, 2016). However, using Dun & Bradstreet credit scores[8] as an objective measure of credit risk, we find little difference in the overall credit scores between low- and high-tech going-green SMEs, with the latter slightly more likely to be in the 'minimal credit risk' category (Appendix A). This

[8] The matching credit scores for SBS respondent firms are only available in 2012.

suggests that there is a sub-optimal level of investment on both demand- and supply-side, where funds are not forthcoming to creditworthy entrepreneurs with viable investment opportunities whilst firms in this niche market suffer from an under-investment problem. More importantly, this could imply that private-sector investment in high-tech going-green SMEs has been crowded out by public funding initiatives, if financial constraints are only found in the private market. We find preliminary support for this conjecture, where high-tech going-green SMEs are as likely as other firms to receive funding from the public sector.

Our results also carry some policy implications. First, our study reveals the importance of regulatory support for cleantech investments, both on short-term and follow-on finance. Here being able to access public funding incentives becomes the key, if not the only, facilitator to the adoption of green technologies. Second, policy makers must make sure that public funding complements, rather than displace private investments. It is necessary to have policy measures that better synthesise the dynamics between the private and public market, potentially through market-oriented supporting mechanisms, such as the UK Enterprise Capital Fund, a government co-funded VC scheme. Third, whilst current policy instruments mainly aim at financing nascent cleantech investment by firms yet to establish good track-record or unable to provide the security required by the private sector, the government should also explore measures to facilitate information flow between SMEs and the private sector. We have shown that certain types of firms, in our case high-tech going-green SMEs, were rationed credit not because of their risk profiles, but based on subjective risk assessment metrics especially by commercial banks. Financial constraints faced by R&D-intensive firms continues to be a concern for UK SMEs (Mina et al, 2013), and the case of public intervention remains valid.

The above discussion give rise to the imminent need for a green finance ecosystem that enables the long-term, sustainable growth of cleantech businesses, at national and international levels (Owen et al, 2018). First, the public sector must work in partnership with the private sector to better understand the financing needs and patterns of smaller, low-carbon firms, in order to provide effective support to cleantech investment. Second, policy makers must realise that supporting eco-innovation is by no means a single or short-term commitment. Policy instruments should make sure that appropriate funding resources are available throughout the lifecycle of cleantech development and adoption, essentially creating a ‘funding escalator’. Last but not least, an

effective finance ecosystem should take measures beyond the provision of financial support, and our results clearly indicate that a supply-side approach is necessary but not sufficient to address the need for more informed and holistic financial resources. Such measures include, but are not limited to an enabling regulation and tax regime, active support networking, business advice, and promotion of 'investment readiness' through all tiers of public education.

Although we are among the first to investigate the financial constraints for cleantech investment in the small business sector, this paper does have some caveats that suggest areas for future research. Our data has little information on the exact nature of the green technologies adopted by SMEs, and thus our results provide limited insights regarding the riskiness of the cleantech investment, and into the detailed mechanism through which banks and other financiers reach their funding decisions. Future research may address it using more qualitative approaches, for example through detailed case study interviews with VCs or bank investment officers. The cross-sectional nature of our analyses also prevents us from testing the causality between financial constraints and eco-innovation, as well as the effectiveness of both public and private capital market in addressing the long-term financing needs by going-green SMEs. Therefore, a natural extension would involve replicating our study in a time-series setting when longitudinal data becomes available. A further issue is whether the specific context of the UK credit market and regulatory environment, means that our findings can be generalised to other countries. Further research at international level would help us to answer this question.

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Table 1
Variable Definition and Sample Descriptive Statistics (Weighted)

Variable	Definition	N	Mean	Std. Dev.	Min	Max
	Panel A: Dependent Variables					
SOUGHT	Firm applied for finance in the past 12 months (0, 1)	9,894	0.242	0.428	0	1
SOUGHT_DEBT	Firm applied for debt-typed finance (0, 1)	2,943	0.890	0.313	0	1
SOUGHT_EQUITY	Firm applied for equity-typed finance (0, 1)	2,943	0.023	0.149	0	1
SOUGHT_OTHER	Firm applied for other types of finance (0, 1)	2,943	0.114	0.317	0	1
RATION1	Firm with trouble getting finance from the first source (0, 1)	2,943	0.348	0.341	0	1
RATION2	Firm got no or part of finance from the first source (0, 1)	2,943	0.268	0.477	0	1
RATION3	Firm got no finance from the first source (0, 1)	2,943	0.215	0.443	0	1
RATION_FULL	Firm got no finance from any source (0, 1)	2,943	0.134	0.411	0	1
DIFF_DEBT	Debt applicants with difficulty getting part or all finance (0, 1)	2,943	0.282	0.450	0	1
DIFF_EQUITY	Equity applicants w. difficulty getting part or all finance (0, 1)	2,943	0.008	0.086	0	1
DIFF_OTHER	Other applicants w. difficulty getting part or all finance (0, 1)	2,943	0.060	0.237	0	1
	Panel B: Explanatory Variables					
Firm characteristics						
HIGHTECH	High-tech industries defined by NESTA, 2015 (0, 1)	9,894	0.180	0.384	0	1
CLEANTECH	Firm took measures to reduce environmental impact (0, 1)	9,894	0.742	0.438	0	1
FAMOWN	Family-owned business (0, 1)	9,894	0.674	0.469	0	1
SOLEPROP	Firm traded as sole proprietor (0, 1)	9,894	0.269	0.443	0	1
PARTNERSHIP	Firm traded as partnership (0, 1)	9,894	0.149	0.356	0	1
CORPORATION	Firm incorporated (0, 1)	9,894	0.582	0.493	0	1
EMP	Number of employees	9,894	8.462	17.703	1	249
AGE_3–	Firm between 0 and 3 years old (0, 1)	9,894	0.064	0.244	0	1
AGE_4TO10	Firm between 4 and 10 years old (0, 1)	9,894	0.260	0.439	0	1
AGE_10+	Firm more than 10 years old (0, 1)	9,894	0.676	0.468	0	1
SALEGROWTH	Percentage change in turnover in the past 12 months (%)	9,894	2.546	20.798	-50	100
PROFIT	Firm generated profit over the past 12 months (0, 1)	9,894	0.811	0.392	0	1
EXPORT	Firm exported outside the UK (0, 1)	9,894	0.233	0.423	0	1
Owner/Entrepreneur characteristics						
OAGE	Owner age	9,894	50.306	10.802	18	90
WLED	Women-led business (0, 1)	9,894	0.182	0.386	0	1
MLED	Firm led by ethnic minority (0, 1)	9,894	0.081	0.273	0	1
QUAL	Owner with qualifications (0, 1)	9,894	0.760	0.427	0	1
AIMGROW	Owner aiming to grow business (0, 1)	9,894	0.683	0.465	0	1

Note: All dependent variables except for *SOUGHT*, are conditional on *SOUGHT* = 1.

Table 2
Cross-tabulation of SMEs' Current and Future (Intention of) Cleantech Usage
(N = 9,894, weighted)

Panel A: Distribution of SMEs by current and future cleantech usage

		Future intention to use cleantech		
		More than currently	Same as currently	Less than currently
Currently using cleantech	Yes	(1) Increased usage (41.03%)	(2) Sustained usage (30.84%)	(3) Reduced usage (4.93%)
	No	(4) New usage (8.51%)	(5) No usage (14.68%)	

Source: authors' own calculation. Figures in the brackets are the percentage of each category in the whole sample.

Panel B: Cleantech usage and key SME business demographics

	(1)		(2)		(3)		(4)		(5)	
Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
EMP	10.439	20.643	7.797	15.719	6.795	13.208	6.726	12.716	5.656	10.694
Firm age										
AGE_3–	0.066	0.248	0.038	0.192	0.055	0.229	0.088	0.284	0.047	0.212
AGE_4TO10	0.263	0.440	0.252	0.434	0.288	0.453	0.307	0.462	0.253	0.435
AGE_10+	0.672	0.470	0.710	0.454	0.657	0.475	0.604	0.489	0.700	0.458
Sector										
Primary	0.033	0.178	0.047	0.211	0.015	0.121	0.003	0.056	0.032	0.175
Production	0.154	0.361	0.131	0.337	0.197	0.398	0.137	0.345	0.112	0.315
Construction	0.098	0.297	0.106	0.308	0.088	0.283	0.090	0.287	0.104	0.305
Trans, retail & dist	0.374	0.484	0.391	0.488	0.353	0.478	0.439	0.497	0.419	0.494
Bus serv	0.226	0.418	0.239	0.426	0.241	0.428	0.229	0.421	0.249	0.432
Other serv	0.116	0.320	0.087	0.282	0.107	0.309	0.101	0.301	0.085	0.279
HIGHTECH	0.203	0.402	0.207	0.405	0.213	0.410	0.182	0.386	0.169	0.375
SALEGROWTH	4.908	21.800	1.903	19.513	1.099	16.811	2.358	18.231	1.601	20.651
PROFIT	0.822	0.383	0.834	0.372	0.792	0.406	0.804	0.398	0.820	0.385

Table 3
Regression results: Decision to apply for finance

	Model 1A		Model 1B		Model 2A		Model 2B	
	Probit model *SOUGHT*							
	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.
HIGHTECH	-0.110*	-0.033	0.166	0.049	-0.114	-0.034	-0.177	-0.052
	(0.064)		(0.119)		(0.070)		(0.164)	
CLEANTECH	0.129***	0.038	0.189***	0.056				
	(0.050)		(0.055)					
*HIGHTECH * CLEANTECH*			-0.358***	-0.106				
			(0.131)					
NEW					0.172*	0.051	0.030	0.009
					(0.100)		(0.109)	
REDUCED					-0.002	-0.001	-0.069	-0.020
					(0.120)		(0.132)	
INCREASED					0.217***	0.064	0.212***	0.062
					(0.070)		(0.077)	
SUSTAINED					0.124*	0.037	0.147*	0.043
					(0.074)		(0.081)	
*HIGHTECH * NEW*							0.708***	0.208
							(0.259)	
*HIGHTECH * REDUCED*							0.332	0.097
							(0.304)	
*HIGHTECH * INCREASED*							0.037	0.011
							(0.181)	
*HIGHTECH * SUSTAINED*							-0.122	-0.036
							(0.192)	
PARTNERSHIP	0.215***	0.064	0.213***	0.063	0.165**	0.049	0.173**	0.051
	(0.071)		(0.071)		(0.077)		(0.077)	
CORPORATION	0.087	0.026	0.086	0.025	0.074	0.022	0.078	0.023
	(0.056)		(0.056)		(0.062)		(0.062)	
AGE_4TO10	0.038	0.011	0.036	0.011	0.072	0.021	0.081	0.024
	(0.096)		(0.096)		(0.109)		(0.109)	
AGE_10+	-0.128	-0.038	-0.124	-0.037	-0.067	-0.020	-0.058	-0.017
	(0.093)		(0.093)		(0.106)		(0.106)	
EMP	0.006***	0.002	0.006***	0.002	0.006***	0.002	0.006***	0.002
	(0.001)		(0.001)		(0.001)		(0.001)	
EXPORT	0.075	0.022	0.071	0.021	0.063	0.019	0.060	0.018
	(0.051)		(0.051)		(0.056)		(0.055)	
SALEGROWTH	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000
	(0.001)		(0.001)		(0.001)		(0.001)	
PROFIT	-0.317***	-0.094	-0.316***	-0.094	-0.332***	-0.098	-0.331***	-0.097
	(0.053)		(0.053)		(0.059)		(0.059)	
AIMGROW	0.355***	0.105	0.353***	0.104	0.319***	0.094	0.322***	0.095
	(0.051)		(0.051)		(0.056)		(0.055)	
FAMOWN	0.035	0.010	0.033	0.010	0.034	0.010	0.033	0.010
	(0.046)		(0.046)		(0.050)		(0.050)	
WLED	-0.093	-0.028	-0.095	-0.028	-0.119*	-0.035	-0.121*	-0.035
	(0.059)		(0.059)		(0.072)		(0.072)	
MLED	-0.080	-0.024	-0.077	-0.023	-0.038	-0.011	-0.037	-0.011
	(0.085)		(0.085)		(0.092)		(0.092)	
QUAL	0.142***	0.042	0.140***	0.041	0.123**	0.036	0.119**	0.035
	(0.050)		(0.050)		(0.054)		(0.054)	
OAGE	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	(0.002)		(0.002)		(0.002)		(0.002)	
Sector/region effects	Yes		Yes		Yes		Yes	
Time indicators	Yes		Yes		Yes		Yes	
N	9,894		9,894		9,894		9,894	
Pseudo R-squared	0.049		0.056		0.050		0.053	
Log likelihood	-1,625.59		-1,613.79		-1,335.56		-1,330.48	

* $p < .10$; ** $p < .05$; *** $p < .01$. Robust standard errors reported in the parentheses. Both point estimates and marginal effects are reported so that the economic significance is shown alongside the statistical significance. Weights applied.

Table 4
Regression results: Alternative types of finance applied

	Model 1A			Model 1B			Model 2A		Model 2B		Model 3A		Model 3B		Model 4A		Model 4B	
	Multinomial logit (Base category = *SOUGHT_DEBT*)						Probit if *SOUGHT* = 1				Probit if *SOUGHT* = 1				Probit if *SOUGHT* = 1			
	NONE	*EQUITY*	*OTHER*	*NONE*	*EQUITY*	*OTHER*	*SOUGHT_DEBT*				*SOUGHT_EQUITY*				*SOUGHT_OTHER*			
	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.
HIGHTECH	0.817	3.618	2.203	1.381	12.717**	0.705	-0.491*	-0.073	-0.395	-0.060	0.997**	0.043	1.239**	0.052	0.580**	0.092	0.194	0.031
	(0.179)	(3.111)	(1.275)	(0.440)	(13.793)	(0.575)	(0.268)		(0.361)		(0.418)		(0.483)		(0.285)		(0.372)	
CLEANTECH	0.757***	1.109	1.877**				-0.311**	-0.047			0.079	0.003			0.444***	0.070		
	(0.075)	(0.644)	(0.597)				(0.154)				(0.287)				(0.146)			
*HIGHTECH * CLEANTECH*	1.727**	0.693	0.442				0.307	0.046			-0.278	-0.012			-0.638**	-0.101		
	(0.415)	(0.622)	(0.282)				(0.299)				(0.467)				(0.303)			
NEW				0.931	1.404	1.236			-0.198	-0.030			0.495	0.021			-0.027	-0.004
				(0.182)	(1.827)	(0.735)			(0.292)				(0.488)				(0.278)	
REDUCED				1.168	3.791	1.394			-0.358	-0.055			0.733	0.031			0.339	0.054
				(0.286)	(3.959)	(1.085)			(0.373)				(0.492)				(0.344)	
INCREASED				0.718**	1.116	1.838			-0.304	-0.046			0.184	0.008			0.386*	0.061
				(0.100)	(0.875)	(0.835)			(0.234)				(0.349)				(0.208)	
SUSTAINED				0.800	2.228	1.627			-0.348	-0.053			0.517	0.022			0.266	0.042
				(0.117)	(2.082)	(0.795)			(0.252)				(0.375)				(0.231)	
*HIGHTECH * NEW*				0.333**	0.000***	3.088			0.376	0.057							0.426	0.068
				(0.160)	(0.000)	(3.290)			(0.545)								(0.563)	
*HIGHTECH * REDUCED*				0.692	0.034**	7.313			-0.490	-0.075			-1.348*	-0.056			-0.909	-0.145
				(0.409)	(0.054)	(9.983)			(0.778)				(0.723)				(0.666)	
*HIGHTECH * INCREASED*				0.880	0.242	0.690			0.446	0.068			-0.637	-0.027			-0.355	-0.056
				(0.304)	(0.300)	(0.635)			(0.412)				(0.579)				(0.403)	
*HIGHTECH * SUSTAINED*				1.394	0.572	2.638			-0.045	-0.007			-0.353	-0.015			0.214	0.034
				(0.519)	(0.651)	(2.438)			(0.439)				(0.551)				(0.431)	
PARTNERSHIP	0.698***	39.553***	0.727	0.751**	34.767***	0.744	0.097	0.015	0.131	0.020	1.429***	0.061	1.390***	0.058	-0.044	-0.007	-0.077	-0.012
	(0.087)	(52.614)	(0.406)	(0.102)	(44.548)	(0.439)	(0.257)		(0.266)		(0.526)		(0.511)		(0.241)		(0.243)	
CORPORATION	0.968	59.225***	3.633***	1.001	46.866***	4.336***	-0.577***	-0.086	-0.670***	-0.102	1.211***	0.052	1.195***	0.050	0.555***	0.088	0.631***	0.100
	(0.097)	(64.582)	(1.389)	(0.111)	(51.739)	(1.758)	(0.185)		(0.189)		(0.454)		(0.448)		(0.168)		(0.182)	
AGE_4TO10	0.929	0.399*	1.514	0.859	0.338	1.264	0.133	0.020	0.179	0.027	-0.605**	-0.026	-0.633**	-0.027	0.215	0.034	0.036	0.006
	(0.156)	(0.217)	(0.920)	(0.167)	(0.229)	(0.766)	(0.217)		(0.242)		(0.286)		(0.274)		(0.270)		(0.306)	
AGE_10+	1.267	0.163***	2.587	1.115	0.099***	1.874	-0.108	-0.016	-0.013	-0.002	-1.054***	-0.045	-1.085***	-0.045	0.462*	0.073	0.318	0.051
	(0.208)	(0.091)	(1.539)	(0.212)	(0.066)	(1.111)	(0.212)		(0.239)		(0.283)		(0.276)		(0.268)		(0.311)	
EMP	0.990***	1.000	0.997*	0.989***	0.998	0.996**	0.002*	0.000	0.002*	0.000	0.000	0.000	0.000	0.000	-0.002*	-0.000	-0.002	-0.000
	(0.001)	(0.003)	(0.002)	(0.001)	(0.004)	(0.002)	(0.001)		(0.001)		(0.002)		(0.002)		(0.001)		(0.001)	
EXPORT	0.941	2.602**	1.369	0.959	2.163**	1.471	-0.257**	-0.039	-0.251**	-0.038	0.323*	0.014	0.380**	0.016	0.187*	0.029	0.203*	0.032
	(0.086)	(1.062)	(0.302)	(0.097)	(0.838)	(0.361)	(0.112)		(0.123)		(0.169)		(0.161)		(0.113)		(0.123)	
SALEGROWTH	0.998	1.001	0.991**	0.998	1.010	0.991*	0.002	0.000	0.002	0.000	0.006	0.000	0.006*	0.000	0.000	0.000	-0.001	-0.000
	(0.002)	(0.009)	(0.004)	(0.002)	(0.009)	(0.005)	(0.002)		(0.003)		(0.003)		(0.003)		(0.002)		(0.002)	
PROFIT	1.581***	0.417**	0.638**	1.619***	0.342**	0.651**	0.296***	0.044	0.281**	0.043	-0.445**	-0.019	-0.423**	-0.018	-0.332***	-0.052	-0.336***	-0.053
	(0.152)	(0.167)	(0.125)	(0.174)	(0.143)	(0.137)	(0.103)		(0.109)		(0.183)		(0.166)		(0.112)		(0.125)	
AIMGROW	0.534***	11.300**	0.762	0.568***	11.419**	0.768	0.061	0.009	0.052	0.008	0.721**	0.031	0.699**	0.029	0.016	0.003	-0.070	-0.011
	(0.050)	(10.982)	(0.206)	(0.058)	(11.761)	(0.222)	(0.139)		(0.147)		(0.343)		(0.354)		(0.132)		(0.139)	
FAMOWN	0.838**	0.384***	0.431***	0.844*	0.334***	0.475***	0.478***	0.071	0.474***	0.072	-0.427***	-0.018	-0.457***	-0.019	-0.383***	-0.060	-0.271***	-0.043
	(0.071)	(0.137)	(0.085)	(0.078)	(0.123)	(0.105)	(0.099)		(0.104)		(0.160)		(0.160)		(0.099)		(0.099)	
WLED	1.237**	1.306	1.847**	1.360**	2.030	2.182***	-0.308**	-0.046	-0.407***	-0.062	0.147	0.006	0.154	0.006	0.211*	0.033	0.347**	0.055
	(0.133)	(0.829)	(0.458)	(0.184)	(1.408)	(0.629)	(0.137)		(0.154)		(0.280)		(0.266)		(0.124)		(0.143)	
MLED	1.323*	3.604**	2.221**	1.238	2.906*	2.104*	-0.610***	-0.091	-0.672***	-0.102	0.545*	0.023	0.541**	0.023	0.612***	0.097	0.604***	0.096
	(0.210)	(2.205)	(0.832)	(0.209)	(1.640)	(0.846)	(0.194)		(0.206)		(0.287)		(0.256)		(0.191)		(0.205)	
QUAL	0.831**	3.263**	1.809**	0.863	3.172*	1.745*	-0.226	-0.034	-0.210	-0.032	0.409	0.017	0.403	0.017	0.296**	0.047	0.323**	0.051
	(0.074)	(1.853)	(0.509)	(0.083)	(1.943)	(0.531)	(0.144)		(0.143)		(0.251)		(0.261)		(0.128)		(0.139)	
OAGE	1.000	1.004	0.992	1.000	1.022	0.991	0.003	0.000	0.004	0.001	0.009	0.000	0.010	0.000	-0.002	-0.000	-0.005	-0.001
	(0.004)	(0.024)	(0.010)	(0.004)	(0.025)	(0.011)	(0.005)		(0.006)		(0.010)		(0.009)		(0.005)		(0.005)	
Sector/region effects		Yes			Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Time indicators		Yes			Yes		Yes		Yes		Yes		Yes		Yes		Yes	
N		9,894			9,894		2,943		2,943		2,943		2,943		2,943		2,943	
Log likelihood		-1,865.24			-1,527.95		-198.55		-166.17		-56.42		-43.06		-209.83		-173.44	
Pseudo R-squared		0.08			0.09		0.20		0.23		0.29		0.33		0.19		0.22	

* p <.10; ** p <.05; *** p <.01. Robust standard errors reported in the parentheses. Both point estimates and marginal effects are reported so that the economic significance is shown alongside the statistical significance, except for Models 1A and 1B, where relative risk ratios (odds ratios) are reported. Weights applied

Table 5

Regression results: Access to external finance by different measures of credit

	Model 1A		**Model 1B**		**Model 2A**		**Model 2B**		**Model 3A**		**Model 3B**		**Model 4A**		**Model 4B**	
	Probit model with sample selection *No finance from any source*				Probit model with sample selection *Had trouble obtaining finance from first source*				Probit model with sample selection *Part or no finance from first source*				Probit model with sample selection *No finance from first source*			
	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.
HIGHTECH	-0.190	-0.018	0.339	0.060	-0.398*	-0.125	-0.250	-0.157	-0.274	-0.064	-0.090	-0.115	-0.166	-0.008	0.053	-0.041
	(0.202)		(0.289)		(0.216)		(0.319)		(0.174)		(0.239)		(0.172)		(0.228)	
CLEANTECH	-0.205**	-0.020			-0.232**	-0.052			-0.220***	-0.033			-0.236***	-0.037		
	(0.097)				(0.092)				(0.073)				(0.077)			
*HIGHTECH * CLEANTECH*	0.435*	0.122			0.662***	0.285			0.504***	0.273			0.397**	0.185		
	(0.226)				(0.227)				(0.188)				(0.189)			
NEW			-0.330	-0.084			-0.241	-0.101			-0.472**	-0.242			-0.367*	-0.177
			(0.230)				(0.180)				(0.185)				(0.192)	
REDUCED			0.000	-0.011			0.076	0.020			0.034	0.000			0.040	-0.002
			(0.247)				(0.221)				(0.185)				(0.181)	
INCREASED			-0.123	0.009			-0.194	-0.024			-0.296***	-0.061			-0.266***	-0.041
			(0.145)				(0.124)				(0.097)				(0.098)	
SUSTAINED			-0.261*	-0.042			-0.396***	-0.136			-0.368***	-0.134			-0.318***	-0.100
			(0.144)				(0.146)				(0.113)				(0.117)	
*HIGHTECH * NEW*			-0.620	-0.165			-0.349	-0.156			-0.198	-0.106			-0.268	-0.135
			(0.421)				(0.448)				(0.367)				(0.367)	
*HIGHTECH * REDUCED*			-5.127**	-1.365			-0.189	-0.084			-0.169	-0.091			-0.171	-0.086
			(2.423)				(0.479)				(0.396)				(0.401)	
*HIGHTECH * INCREASED*			-0.125	-0.033			0.481	0.215			0.284	0.152			0.144	0.073
			(0.313)				(0.345)				(0.259)				(0.248)	
*HIGHTECH * SUSTAINED*			0.327	0.087			0.803**	0.358			0.535*	0.287			0.396	0.199
			(0.335)				(0.399)				(0.284)				(0.278)	
PARTNERSHIP	-0.159	-0.005	-0.289**	-0.044	-0.265**	-0.063	-0.251**	-0.063	-0.272***	-0.058	-0.207**	-0.037	-0.265**	-0.049	-0.233**	-0.047
	(0.138)		(0.130)		(0.127)		(0.117)		(0.096)		(0.098)		(0.103)		(0.099)	
CORPORATION	-0.078	-0.009	-0.147	-0.027	0.075	0.049	0.094	0.059	-0.071	-0.009	-0.034	0.008	-0.074	-0.011	-0.082	-0.016
	(0.101)		(0.102)		(0.158)		(0.137)		(0.077)		(0.081)		(0.086)		(0.082)	
AGE_4TO10	0.047	0.023	0.031	0.022	-0.221	-0.082	-0.254	-0.093	-0.157	-0.063	-0.149	-0.051	-0.086	-0.021	-0.110	-0.028
	(0.155)		(0.178)		(0.167)		(0.172)		(0.126)		(0.136)		(0.128)		(0.133)	
AGE_10+	-0.047	-0.034	-0.014	-0.017	-0.292	-0.152	-0.279	-0.145	-0.144	-0.127	-0.104	-0.090	-0.105	-0.090	-0.075	-0.071
	(0.185)		(0.176)		(0.308)		(0.232)		(0.158)		(0.140)		(0.189)		(0.149)	
EMP	-0.008***	-0.001	-0.008***	-0.001	-0.007***	-0.002	-0.008***	-0.002	-0.007***	-0.001	-0.008***	-0.002	-0.008***	-0.002	-0.008***	-0.002
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
EXPORT	0.036	0.023	-0.010	0.008	0.087	0.055	0.094	0.059	-0.016	0.023	-0.027	0.011	-0.060	-0.002	-0.078	-0.014
	(0.103)		(0.090)		(0.133)		(0.108)		(0.073)		(0.071)		(0.073)		(0.071)	
SALEGROWTH	-0.007**	-0.002	-0.009***	-0.002	-0.006**	-0.002	-0.007***	-0.002	-0.005***	-0.002	-0.006***	-0.002	-0.005**	-0.002	-0.006***	-0.002
	(0.003)		(0.003)		(0.002)		(0.002)		(0.002)		(0.002)		(0.002)		(0.002)	
PROFIT	-0.039	-0.070	0.078	-0.042	-0.175	-0.152	-0.101	-0.140	-0.037	-0.151	0.020	-0.131	0.003	-0.111	0.093	-0.091
	(0.182)		(0.151)		(0.310)		(0.217)		(0.133)		(0.100)		(0.165)		(0.110)	
FAMOWN	-0.055	-0.010	-0.077	-0.015	-0.033	-0.006	-0.018	0.000	-0.071	-0.025	-0.077	-0.028	-0.025	-0.000	-0.028	-0.001
	(0.079)		(0.084)		(0.073)		(0.075)		(0.061)		(0.064)		(0.064)		(0.064)	
WLED	0.119	0.011	0.073	-0.004	0.217**	0.065	0.087	0.003	0.207**	0.057	0.200**	0.054	0.230**	0.061	0.211**	0.055
	(0.100)		(0.128)		(0.099)		(0.111)		(0.082)		(0.091)		(0.096)		(0.092)	
MLED	0.014	-0.014	0.092	0.014	0.213	0.070	0.259	0.100	0.210*	0.072	0.217*	0.088	0.171	0.044	0.168	0.057
	(0.149)		(0.142)		(0.139)		(0.159)		(0.117)		(0.123)		(0.119)		(0.121)	
QUAL	-0.088	0.002	0.010	0.026	0.014	0.040	0.030	0.048	-0.044	0.036	0.013	0.060	-0.096	0.006	-0.033	0.036
	(0.100)		(0.119)		(0.149)		(0.119)		(0.075)		(0.077)		(0.074)		(0.077)	
OAGE	0.004	0.001	0.002	0.001	0.008*	0.003	0.006*	0.003	0.007**	0.003	0.005	0.002	0.005	0.002	0.003	0.001
	(0.004)		(0.004)		(0.004)		(0.004)		(0.003)		(0.003)		(0.003)		(0.003)	
Sector/region effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Time indicators	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
N	9,894		9,894		9,894		9,894		9,894		9,894		9,894		9,894	
Selected N	2,943		2,943		2,943		2,943		2,943		2,943		2,943		2,943	
Log likelihood	-1,875.07		-1,510.63		-2,041.17		-1,658.08		-1,990.55		-1,065.82		-1,956.52		-1,577.45	
χ^2 ($\rho = 0$)	2.58		3.75*		0.66		1.82		6.00**		14.93***		3.06*		6.87***	

* $p < .10$; ** $p < .05$; *** $p < .01$. Robust standard errors reported in the parentheses. Both point estimates and marginal effects are reported so that the economic significance is shown alongside the statistical significance. Weights applied. Exclusion restrictions: 12 UK region indicators and entrepreneurial growth intention (*AIMGROW*).

Table 6
Regression results: Difficulty in access to alternative sources of finance

	Model 1A		**Model 1B**		**Model 2A**		**Model 2B**		**Model 3A**		**Model 3B**	
	Probit model with sample selection *DIFF_DEBT*				Probit if *SOUGHTEUIQTY* = 1 *DIFF_EQUITY*				Probit model with sample selection *DIFF_OTHER*			
	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.
HIGHTECH	-0.272	-0.115	-0.203	-0.169	-1.071	-0.223	-3.654***	-0.606	-0.817*	-0.191	-0.133	-0.047
	(0.188)		(0.296)		(1.033)		(1.383)		(0.489)		(0.755)	
CLEANTECH	-0.203***	-0.045			-2.661**	-0.553			-0.392	-0.059		
	(0.073)				(1.375)				(0.337)			
*HIGHTECH * CLEANTECH*	0.541***	0.330			1.524	0.317			0.758	0.287		
	(0.204)				(1.183)				(0.573)			
NEW			-0.233	-0.102							-1.038	-0.349
			(0.170)								(0.747)	
REDUCED			0.038	-0.009							-0.448	-0.108
			(0.201)								(0.688)	
INCREASED			-0.204*	-0.028			-5.662***	-0.939			-0.563	-0.110
			(0.111)				(1.711)				(0.419)	
SUSTAINED			-0.307**	-0.110			-3.373**	-0.559			-0.906*	-0.258
			(0.125)				(1.318)				(0.520)	
*HIGHTECH * NEW*			-0.449	-0.227							-0.190	-0.064
			(0.413)								(1.118)	
*HIGHTECH * REDUCED*			0.105	0.053							-5.415*	-1.808
			(0.457)								(2.881)	
*HIGHTECH * INCREASED*			0.419	0.212			5.187***	0.860			-0.368	-0.123
			(0.322)				(1.320)				(0.773)	
*HIGHTECH * SUSTAINED*			0.705**	0.356							1.334	0.445
			(0.349)								(1.202)	
PARTNERSHIP	-0.268***	-0.070	-0.237**	-0.062	5.261***	1.094	3.630***	0.602	-0.371	-0.118	-0.203	-0.047
	(0.095)		(0.108)		(1.569)		(1.316)		(0.483)		(0.487)	
CORPORATION	0.015	0.003	0.076	0.022	4.274***	0.889	3.771***	0.625	0.104	0.139	-0.019	0.101
	(0.080)		(0.094)		(0.994)		(0.905)		(0.640)		(0.655)	
AGE_4TO10	-0.191	-0.094	-0.295*	-0.118	2.681***	0.558	0.623	0.103	0.008	0.036	0.068	0.038
	(0.135)		(0.165)		(0.940)		(1.255)		(0.511)		(0.476)	
AGE_10+	-0.150	-0.160	-0.268	-0.164	1.671	0.348	0.502	0.083	0.104	0.086	0.019	0.037
	(0.166)		(0.195)		(1.109)		(1.645)		(0.532)		(0.474)	
EMP	-0.007***	-0.002	-0.008***	-0.002	0.002	0.000	-0.012	-0.002	-0.006**	-0.002	-0.005**	-0.001
	(0.001)		(0.001)		(0.006)		(0.013)		(0.003)		(0.002)	
EXPORT	0.042	0.044	0.072	0.043	0.760	0.158	0.713	0.118	-0.121	-0.001	-0.125	0.005
	(0.072)		(0.084)		(0.633)		(0.596)		(0.257)		(0.252)	
SALEGROWTH	-0.004***	-0.002	-0.006***	-0.002	0.009	0.002	0.020***	0.003	-0.004	-0.001	-0.010	-0.004
	(0.002)		(0.002)		(0.006)		(0.006)		(0.004)		(0.007)	
PROFIT	-0.084	-0.163	-0.100	-0.145	-0.099	-0.021	0.008	0.001	0.058	-0.063	0.177	-0.023
	(0.107)		(0.128)		(0.496)		(0.916)		(0.366)		(0.333)	
FAMOWN	-0.061	0.019	-0.029	0.028	1.211**	0.252	-0.782	-0.130	-0.250	-0.145	-0.364	-0.153
	(0.063)		(0.078)		(0.550)		(0.681)		(0.351)		(0.334)	
WLED	0.225***	0.057	0.180	0.017	-3.022**	-0.628	-1.912	-0.317	-0.152	-0.036	-0.398*	-0.095
	(0.082)		(0.111)		(1.354)		(1.494)		(0.209)		(0.233)	
MLED	0.215*	0.047	0.278**	0.079	1.013	0.211	0.103	0.017	0.282	0.169	0.260	0.147
	(0.119)		(0.141)		(0.633)		(0.715)		(0.417)		(0.426)	
QUAL	-0.038	0.020	-0.004	0.026	-0.394	-0.082	-0.088	-0.015	0.289	0.180	0.305	0.171
	(0.071)		(0.083)		(0.965)		(1.093)		(0.522)		(0.558)	
OAGE	0.004	0.002	0.003	0.001	0.029	0.006	0.073*	0.012	0.022*	0.008	0.031**	0.010
	(0.003)		(0.003)		(0.019)		(0.042)		(0.012)		(0.014)	
Sector/region effects	Yes		Yes		Yes		Yes		Yes		Yes	
Time indicators	Yes		Yes		Yes		Yes		Yes		Yes	
N	9,894		9,894		77		77		9,894		9,894	
Selected N	2,598		2,598						428		428	
Log likelihood	-1,904.94		-1,529.35		-6.34		-3.30		-381.00		-317.23	
χ^2 ($\rho = 0$)	7.70***		6.94***		294.36***		392.39***		0.48		0.64	

* $p < .10$; ** $p < .05$; *** $p < .01$. Robust standard errors reported in the parentheses. Both point estimates and marginal effects are reported so that the economic significance is shown alongside the statistical significance. Sector effect included and weights applied. Models 2A & 2B use uncondition probit regressions and the Wald chi-squared is reported instead. The selection equations are the probability of a firm applying for the particular type of finance. Exclusion restrictions: 12 UK region indicators and entrepreneurial growth intention (*AIMGROW*). Weights applied.

Table 7
Robustness tests: Voluntary use of clean-tech or regulation complier

	Model 1		**Model 2**	
	Probit model *SOUGHT*		Probit model with sample selection *No finance from any source*	
	Coefficient	M.E.	Coefficient	M.E.
HIGHTECH	0.181	0.052	-0.809*	-0.208
	(0.220)		(0.479)	
SELFCLEAN	0.331***	0.095	-0.452**	-0.084
	(0.107)		(0.176)	
*HIGHTECH * SELFCLEAN*	-0.753***	-0.216	1.363**	0.404
	(0.276)		(0.561)	
PARTNERSHIP	0.461***	0.133	0.224	0.133
	(0.178)		(0.383)	
CORPORATION	0.097	0.028	0.166	0.062
	(0.132)		(0.247)	
AGE_4TO10	-0.108	-0.031	0.076	0.019
	(0.196)		(0.308)	
AGE_10+	-0.338*	-0.097	-0.326	-0.136
	(0.188)		(0.385)	
EMP	0.004***	0.001	-0.008***	-0.002
	(0.001)		(0.002)	
EXPORT	0.152	0.044	0.041	0.034
	(0.120)		(0.250)	
SALEGROWTH	0.000	0.000	-0.002	-0.001
	(0.002)		(0.004)	
PROFIT	-0.260**	-0.075	-0.439	-0.169
	(0.118)		(0.289)	
AIMGROW	0.433***	0.125		
	(0.125)			
FAMOWN	0.091	0.026	0.068	0.036
	(0.111)		(0.215)	
WLED	-0.036	-0.010	-0.116	-0.042
	(0.105)		(0.200)	
MLED	-0.313	-0.090	-0.582	-0.224
	(0.213)		(0.438)	
QUAL	0.152	0.044	-0.689***	-0.180
	(0.129)		(0.222)	
OAGE	-0.002	-0.000	0.007	0.002
	(0.005)		(0.009)	
N	1,960		1,960	
Selected N	-		593	
Log likelihood	-296.75		-352.50	
Pseudo R-squared	0.09		-	
χ^2 ($\rho = 0$)	-		1.63	

* $p < .10$; ** $p < .05$; *** $p < .01$. Model 1 uses the same specification as Model 1B in Table 4 and Model 2 uses the same specification as Model 1A in Table 6. Weights applied. *SELFCLEAN* =1 if firm taking clean-tech measures not (or not only) to comply with regulations.