

Management capability, business support and the performance of micro-businesses in the UK

ERC Research Paper 68

May 2018

Management capability, business support and the performance of micro-businesses in the UK

Andrew Henley

Cardiff Business School

HenleyA@cardiff.ac.uk

Meng Song

Cardiff Business School

SongM5@cardiff.ac.uk

The Enterprise Research Centre is an independent research centre which focusses on SME growth and productivity. ERC is a partnership between Warwick Business School, Aston Business School, Imperial College Business School, Strathclyde Business School, Birmingham Business School and Queen's University School of Management. The Centre is funded by the Economic and Social Research Council (ESRC); Department for Business, Energy & Industrial Strategy (BEIS); Innovate UK, the British Business Bank and Intellectual Property Office. The support of the funders is acknowledged. The views expressed in this report are those of the authors and do not necessarily represent those of the funders.

ABSTRACT

This report documents analysis from Waves 1 and 2 of the UK Longitudinal Small Business Survey, focused on the subsample of sole-proprietorships and micro-businesses (less than 10 employees), comprising 3,882 businesses. The report is specifically concerned with the impact of business planning, support and advice on performance outcomes. Performance is captured by indicators of innovation propensity, exporting propensity and intensity and turnover per employee (productivity) and in turn innovation and exporting are conceptualised as feeding into productivity performance. Analysis is undertaken using multivariate regression and econometric analysis of treatment effects, exploiting the longitudinal nature of the data. The main findings are as follows. Firstly, micro-businesses that innovate are more likely to have formal business plans, use external advice or information and have awareness of business support available from the government. Secondly, these factors do not have directly discernible impacts on exporting activity, but may affect export performance indirectly through a link from innovation to improved exporting. Thirdly, micro-businesses appear to benefit indirectly from a learning effect via exporting which in turn supports improvements in productivity. Business planning and support activities ought therefore to focus in particular on supporting innovation activity in micro-businesses, but may achieve little direct traction if focused towards the other business performance outcomes.

CONTENTS

ABSTRACT	3
1. INTRODUCTION	5
2. BACKGROUND.....	7
3. DATA.....	10
3.1 Overview of LSBS.....	10
3.2 Micro-business performance.....	11
3.3 Business capabilities and support.....	12
4. MODELS.....	13
4.1 Multivariate regression models of business performance ..	14
4.2 Matching models for business support as a treatment effect	16
4.3 Covariates.....	17
5. FINDINGS.....	18
5.1 Multivariate analysis.....	18
5.2 Treatment effects	21
6. DISCUSSION.....	23
7. CONCLUSIONS	26
REFERENCES.....	28

1. INTRODUCTION

Over the past decade, since the global financial crisis, the UK has seen a sharp growth in micro-businesses and in particular in the numbers of sole-trader businesses operated by the self-employed. Despite concerns that rising self-employment may reflect the growth of the so-called 'gig economy', available data suggest that over 75% of the self-employed are business owners rather than freelancers or subcontractors (authors' own analysis from ESRC Understanding Society, Wave 6, 2014-15). Businesses rarely start life as fully-formed small organisations employing others. In fact, growing self-employment has also coincided with a fall in the proportion of micro-businesses who create jobs (Henley, 2016). Furthermore, there is no automatic link between small business start-up and job creation (van Stel and Storey, 2004). Researchers arguably know relatively little about what drivers might be associated with small business performance at the lowest levels of the firm size distribution, other than propositions about the human and financial capital characteristics of the business owner and, possibly, the local environmental conditions facing the business in question.

The growth in the numbers of micro-businesses who stay small or as sole-traders gives grounds for concern in terms of overall performance of the small business sector in the UK and may play a part in explaining the current poor UK productivity performance. In turn this raises important policy questions concerning the nature and effectiveness of small business support and the extent to which micro-businesses, in particular, are positive about capability to improve business performance and are able to access appropriate advice and support to achieve it.

This report is concerned with the research questions of whether the performance of micro-businesses (defined as having between zero and nine employees) is associated with better perceived management capability and business planning practice and with the awareness and use of business support. Performance is assessed across three domains: innovation activity, exporting activity and a broad productivity measure defined as turnover per employee.¹

¹ Labour productivity ought properly to be defined as value added per hour, but in the data sources used in the study neither hours of work nor information to calculate value added is available.

The research in the report draws on analysis of the first two waves of the UK Longitudinal Small Business Survey (LSBS) (BEIS, 2017). Previous work on the first wave of LSBS has focused on cross-sectional analysis of a range of topics, with particular emphasis on innovation, internationalisation and finance (Broughton and Felici, 2016; Owen et al., 2016; Gkypali and Roper, 2017; Johnston et al., 2017), topics where the LSBS questionnaire instrument contains a good level of detail. This work to date has also tended to focus on the full sample of SMEs, up to 250 employees, covered in the LSBS. Over two-thirds of these have private limited company status with ownership interest restricted to shareholding. Conclusions drawn may not be particularly specific to micro-enterprises and in particular to the smallest of those. The LSBS provides a sample of almost 4000 businesses who employed below ten in the first wave (2015) and who remain in the survey in the second wave (2016). This provides unique access to large scale longitudinal data on micro-enterprise in the UK. The longitudinal aspect of the data, although limited to two annual waves at this stage, allows researchers to address potential selection issues concerning contemporaneous correlation between business performance and engagement with business support provision.

The main findings in the study are as follows. First, micro-businesses that innovate are more likely to have formal business plans, use external advice or information and have awareness of business support available from the government. Second, these factors do not have a directly discernible impact on exporting activity. However, innovation appears to encourage micro-businesses to compete internationally via exporting activity. In addition, there is some evidence that awareness of government business support improves the likelihood and intensity of exporting of service sector micro-businesses. Third, micro-businesses appear to benefit indirectly from a learning effect via exporting which supports improvements in productivity. Overall, internal effort to form business plans, seek external advice, information or support does not directly lead to productivity gain. However, these activities will endow them with an ability to obtain competitive advantage in the form of increased likelihood of innovation and exporting activity, which will in turn ultimately contribute to productivity improvement.

The remainder of the report is structured as follows. Section 2 provides a background overview and reviews relevant previous literature. Section 3 provides further description of the data source. Section 4 describes the methods. Section 5

presents findings. Section 6 provides further discussion and analysis. Section 7 concludes.

2. BACKGROUND

Resource-based theory suggests the importance of seeking external business assistance to obtain strategic knowledge and overcome knowledge gaps (Bennett and Robson, 2003). As external advice is often contextual and experience-based and therefore hard to codify or replicate, knowledge obtained from external sources is likely to be transformed into sustainable competitive advantage (Chrisman and McMullan, 2004). SMEs tend to suffer from resource and skill deficiencies. Utilising external business advice could be crucial in allowing them to boost performance (Mole et al., 2017). Firms that need to fill gaps in staff or management expertise, or who are experiencing a decline of business, may have a particular need to seek external advice for growth purposes. Robson and Bennett (2000) find that firms obtaining external advice have better performance than those do not, but that not all forms of advice bring such benefits. These authors find that external advice on business strategy and staff recruitment is associated with higher performance. Berry et al. (2006) also observe that the use of a range of external advice leads to higher growth in SMEs in the UK. Van Doorn et al. (2017) conclude that Dutch firms seeking external advice will increase entrepreneurially-oriented activities involving higher pro-activeness, risk-taking and innovation. In a more general sense, considering external advice as a source of access to external knowledge networks, research suggests that entrepreneurs who use more external network ties to seek knowledge are able expand their business size, even in the case of newly established businesses (Sullivan and Marvel, 2011). Entrepreneurs with inadequate knowledge can discuss starting and operating business and gaining access to important resources via these external knowledge linkages (Tortoriello, 2015; Baker, 2016).

The open innovation literature stresses the importance of internal capabilities to utilise external knowledge to produce innovation. This is because firms need internal capabilities to identify, absorb and successfully apply external knowledge to generate innovation, widely referred to as absorptive capacity (Cohen and Levinthal, 1990). In the process of innovation, firms need to collect, sort and analyse both internal and external knowledge and ensure that such new knowledge is appropriate to business goals and integration within existing

production processes (Robertson et al., 2012). Superior capabilities help firms create knowledge that will lead to better performance especially in highly competitive or challenging environment such as international markets (Knight and Cavusgil, 2004). Brunswicker and Vanhaverbeke (2015) find that European SMEs need to have internal capacity for managing innovation at a strategic and operational level to have better innovation performance.

To ease resource constraints faced by SMEs, governments often provide resources to nurture SME development. Government support can take various forms including grants, loans, R&D tax credits and innovation subsidies (Doh and Kim, 2014; Rao, 2016). Hewitt-Dundas and Roper (2010) observe, in the Ireland and Northern Ireland context, that public support for innovation not only encourages manufacturing firms to initiate innovation, but also improves the quality and sophistication of innovation output. Foreman-Peck (2013) finds that SMEs that have received UK state support are more likely to innovate and such innovation will further lead to turnover growth. However, there is no guarantee that public support for small business will generate positive innovation or growth outcomes (Guan and Yam, 2015). Furthermore, lags between particular forms of funding and subsequent impact on outcomes may vary considerably from firm to firm.

In the present study, data on realised government support are not available. We therefore adopt an indicator of SMEs' awareness of government support to evaluate the potential impact of government support on business performance. This is based on conceptualisation from the entrepreneurship literature suggesting that strong entrepreneurship motivates SMEs actively to seek business growth opportunities (Wiklund et al., 2009; Moen et al., 2016). Experienced entrepreneurs are good at connecting seemingly unrelated information to identify business opportunities and derive performance benefits (Gruber et al., 2008; Koryak et al., 2015). We therefore propose that a micro-firm's awareness of government business support programmes is an indicator of the extent to which the firm proactively seeks out sources of information which could be accessed if needed for growth purposes.

Business planning formalises the process of marshalling knowledge and organising evidence. It consists of four key elements: the specification of objectives, generation of strategies, evaluation of alternative strategies and implementation and monitoring results (Armstrong, 1982). There has long been a

debate about the value of business planning for performance (Sirén and Kohtamäki, 2016; Wolf and Floyd, 2017). The ‘planning school’ believes that organisations that more accurately analyse and predict changes in their situation will outperform those that do not. Planning can stabilise business performance by exploring alternative options in order to adjust to environmental changes (Ansoff, 1991; Wiltbank et al., 2006). A formal business plan is helpful for firms to implement innovation plans and reduce resistance to change during implementation (Terziovski, 2010). Formal business plans also facilitate identification of business opportunities and external knowledge (Brunswicker and Vanhaverbeke, 2015). Business planning can facilitate decision-making among alternative strategies, achieving goals and prepare the organisation for future challenges (Brinckmann et al., 2010). By way of summary, Delmar and Shane (2003) state that business planning facilitates goal achievement by developing specific steps, making faster decisions and managing resources to avoid costly activity disruptions. Dibrell et al. (2014) find that firms have improved innovation performance when they are able to incorporate internal resources with identified opportunities via formal strategic planning. Earlier empirical evidence supporting the planning school also includes studies by Miller and Cardinal (1994) and Goll and Rasheed (1997).

On the other hand, the ‘learning school’ argues that firms learn from feedback and that their subsequent strategies will reflect more such learning experiences, rather than prior predictions formalised in planning statements. Particularly in an uncertain and unpredictable environment, firms need to react rapidly in order to capture opportunities, by adopting flexible and emergent strategies (Mosakowski, 1997). It could be misleading and risky for organisations to rely unduly on explicit planning because contemporaneous analysis and planning are unlikely to be able to address complex realities. Organisations therefore need to have a sophisticated understanding of the richness and complexity of current realities (Mintzberg, 1978) and micro-businesses would be no exception to this.

In summary, many micro-businesses face significant and often complex needs in the challenge of matching resources and opportunities to current business environments. The ability to identify, acquire and process information is integral to this. Indicators of micro-business awareness of and access to sources of information, advice and support may provide useful data in assessing this ability. In turn these may translate into improved business performance and outcomes across a range of domains.

3. DATA

3.1 Overview of LSBS

This report is based on analysis of the Longitudinal Small Business Survey (LSBS) commissioned by the Department for Business, Innovation and Skills (BIS) and conducted in 2015 (wave 1) and 2016 (wave 2). Technical details and full questionnaires are provided in BIS (2016) and BEIS (2017). A stratified sampling method was used where the samples were stratified by firm size (measured by number of employees), region and industry sector. The Interdepartmental Business Register (IDBR) was used as the sample source for registered businesses, while Dun and Bradstreet's database was used for unregistered businesses. In 2015 the overall response rate for IDBR contacts was 19 per cent and 9 per cent for Dun and Bradstreet contacts. The achieved 2015 sample was a total of 15,501 businesses. Of these 7,279 were successfully re-contacted in 2016 (with a further 1,969 new businesses added to rebalance the sample). Aside from those businesses not selected to remain in the panel, the most significant reason for sample attrition in 2016 was refusal. Just under 900 (6%) of the originally sampled businesses were uncontactable in 2016 or were known to have ceased trading.

The questionnaires in 2015 and 2016 provide information about turnover, employment, innovation and exporting activity. They also provide information on awareness of government business support and access to business support provision from a variety of sources for different purposes, as well as use of a formal business plan and perceived firm business capabilities (2015 only).

The focus of this report is on the sub-sample of micro-businesses, defined as firms that are sole proprietorships or that have less than 10 employees. Of the 7,279 businesses in the two waves of the panel, 3,882 were a micro-business in the first wave. Only 161 of these had grown to 10 employees or over by 2016. There is some further sample reduction due to non-response or "don't know" responses to particular questions. Summary statistics reported in Table 1 shows that about half of the firms in the micro-business sample (49%) are sole proprietorships.²

² A full correlation matrix for the variables of interest is reported in the Appendix, Table A3.

3.2 Micro-business performance

Three domains of business performance can be assessed using the LSBS data: innovation activity over the previous three years, export performance over the past year and annual turnover per employee. Previous work has found a positive impact of innovation and exports on SMEs' growth (see the review in Love and Roper, 2015). However, these domains have been typically studied in isolation. We propose taking a step further in order to examine internal associations between innovation, exporting and productivity (revenue per employee), to have more thorough understanding of SMEs' behaviour and performance. We begin by exploring the determinants of innovation, since logically innovation in either product/service, process or organisation ought to lead to improved market penetration and performance. The second stage involves transforming innovation into competitive advantage that will allow firms to compete through exporting activity in international markets (Golovko and Valentini, 2011; Love and Roper, 2015). Finally, we examine the extent to which both innovation and exporting activity contribute to economic performance measured by turnover per employee.

The data in Table 1 reveal that just under half of the micro-businesses (49.5%) had engaged in product, services or process innovation in the three years up to 2015 and 17% had developed new-to-the-market products, services or processes innovation. The proportion engaged in exporting activity was lower. 9% of micro-business had exported goods in the past year and 13% had exported services. Among goods exporters, an average of 23% of total sales was achieved from exporting activities; whereas for services exported this percentage was a slightly higher at an average of 27%. For turnover per employee information there is some loss of sample due to missing responses, even after incorporating some banded responses. The distribution is quite skewed – in 2015 mean turnover for micro-businesses was about £150,000 per employee, but the median was only £80,000. So for modelling purposes turnover per employee is expressed in log form. There is a slight fall in average (log) turnover per employee between 2015 and 2016, but this fall should be treated with caution given that panel attrition might be non-random.

3.3 Business capabilities and support

Overall micro-businesses appear quite optimistic about their business capabilities. The indicators reported in Table 1 are coded as binary variables from 5-point questionnaire responses ('very poor', 'poor', 'average', 'strong', 'very strong'), such that 1 records responses of 'strong' or 'very strong' and 0 otherwise. 58% of micro-businesses in 2015 report strong or very strong capability for developing and implementing a business plan and strategy. 55% report strong or very strong capability for developing and introducing new products or services. 39% report strong or very strong capability to access external finance. 66% report strong or very strong capability for operational improvements towards industry best practice.

In 2015, 61% of micro-businesses report awareness of the availability of support from the following UK government sources: UK Trade and Investment (UKTI), Tools for Business section on the .GOV website, British Business Bank, Innovate UK, or the Business Growth Service. This high figure indicates a good appreciation that support is available for those small businesses who wish to grow or improve innovation or export performance. However, it does not include potential awareness of other private or regional sources of advice and support. As a potential indicator of orientation towards achieving improved performance this figure suggests that three-fifths of micro-businesses are considering performance improvement to the extent of making themselves aware of where support might be available.

The extent to which micro-businesses in practice access external advice or information is much lower. Only 32% report in 2015 that they have used one or more sources of external information or advice, for either strategic or operational ('day-to-day running') purposes in the past year. These sources might include a wide range from private, professional or governmental sources. The only questionnaire restriction is that the advice or information has to be provided in more than a casual conversation. In 2016 this proportion had fallen quite significantly to only 23%, although again care should be taken in interpreting this change. Sources of information and advice vary considerably. Focusing solely on information or advice which was sought for strategic business purposes, 4% report seeking this to help with business growth, less than 2% for marketing purposes and below 1% for exporting or innovation purposes. Other areas for which advice is sought include legal, finance and employment issues, but again the levels of positive

response are low. Potentially also of concern is the very low level of help sought for management (including leadership development).

Nevertheless, despite low levels of actual help sought, 36% of micro-businesses report in 2015 that they have a formal, written business plan, something that might be considered essential for securing access to external finance or funding support. This proportion rises to 47% in 2016, although again caution is required, as this may reflect the suggestion that those with a formal business plan are more likely to survive.

Two other areas where businesses may gain advantage in terms of capability to improve performance concern ease of access to business networking and ease of access to wider sources of information beyond the immediate business locality. Two other indicators might provide proxy information on this. The first is whether a business is located in a rural location and therefore at disadvantage from proximity to networking, ease of knowledge spillover and agglomeration benefits (Thornton and Flynn, 2003; Minniti, 2005; Hayter, 2013). More generally firm characteristics, development barriers and business strategies in rural or urban areas may differ (Lee and Cowling, 2015). The second is whether the business has multiple sites, for example having a London or other city-centre office for marketing or other purposes. This is included in the model to capture information and knowledge obtained via the firm's internal organisational network (Zhou and Li, 2012), notwithstanding that in the case of a micro-business that network might be small. 32% of micro-businesses are in rural areas and are likely to reflect rural sectoral composition towards tourism and other land-based business activity. Just under 10% of micro-businesses operate from multiple business premises.

4. MODELS

We test for associations between firms' business capabilities and their engagement with business support activity with firm performance using two different approaches. The first approach uses multivariate regression analysis, appropriate to the firm performance measure in question, in order to investigate the quantitative and statistical significance of any associations, controlling for a range of other covariates which are potentially correlated with firm performance. One potential econometric issue here is that firm performance and business support engagement, or firm performance and perceived business management

capability might be endogenous. In other words, firms may engage with forms of business support or may perceive that they have better business management capability because they are already performing well. The longitudinal nature of the LSBS data allows us one potential solution to this, in that we can use prior-dated (2015) information on business management capability and on business support engagement to explain later (2016) performance. This is likely to be more reliable in the case of exporting and turnover per employee since this information relates the past 12 months. However, this empirical strategy will be less robust in the case of innovation, where the outcome variable relates to the previous three years.

The second approach further addresses issues of endogeneity or sample selection bias by using matching methods to estimate the average treatment effect (for the treated) (ATT) on gaining awareness of business support, preparation of a formal business plan or use of business support help on performance. This addresses any sample selection bias by matching treated firms with untreated ones. Two matching methods are investigated – propensity score matching and bias-corrected matching.

4.1 Multivariate regression models of business performance

Multivariate regression is used for each of the three performance domains, described above, as an outcome variable. Firstly, innovation as an outcome is measured by two dependent variables (Mention, 2011). The first indicator is whether or not a firm has any product, service or process innovation and the second one is whether or not a firm has any new to the market product, service or process innovation. A binary outcome model is specified and estimated by a logit model using maximum likelihood function. The latent variable *Innovation** is defined as capturing the probability of a firm having innovation output and *Innovation* equals to 1 when *Innovation** is greater than zero:

$$Innovation^*_{it} = \alpha_0 + \alpha_1 * Aware_{it-1} + \alpha_2 * Advice_{it-1} + \alpha_3 * Plan_{it-1} + \alpha_4 * X_{1it-1} + \varepsilon_{1it}$$

$$Innovation_{it} = \begin{cases} Innovation^*_{it} & \text{if } Innovation^*_{it} > 0 \\ 0 & \text{if } Innovation^*_{it} \leq 0 \end{cases} \quad (1)$$

where X_1 is a vector of explanatory variables that are expected to affect firm performance and the variables included are described in the sub-section below on covariates. To capture firms' orientation towards performance improvement, we use a dummy variable *Aware* which equals 1 if a firm states, in the previous year,

awareness of business support, as described above, from a number of UK central government support services. Use of business support services is captured through a dummy variable *Advice* which equals 1 if a firm states that it has sought information or advice from the range of sources described above. We also include the variable *Plan* which is a dummy variable indicating whether a firm has a formal written business plan.

Secondly, as noted above, the LSBS survey provides information on exporting activity in both goods and services. In some cases, firms engage in both, for example where they supply a product and then provide follow-on service and support activity. We first employ a binary logit model to examine the determinants of micro-businesses' export decision, for either goods or services, or both (i.e. 1 if a firm exports and 0 otherwise) and then a Tobit model to examine what determines their export intensity, in either goods or services, defined as the percentage of turnover that is accounted for by exports. The Tobit is used as exporting is a variable which is left-censored at zero. *Export** is a latent variable and the model specification is:

$$Export^*_{it} = \beta_0 + \beta_1 * Aware_{it-1} + \beta_2 * Advice_{it-1} + \beta_3 * Plan_{it-1} + \beta_4 * X_{1it-1} + \beta_5 * X_{2it-1} + \varepsilon_{2it}$$

$$Export_{it} = \begin{cases} Export^*_{it} & \text{if } Export^*_{it} > 0 \\ 0 & \text{if } Export^*_{it} \leq 0 \end{cases} \quad (2)$$

where X_1 is the same set of covariates defined earlier for explaining innovation in model (1). X_2 is an additional set. This includes a dummy variable indicating whether or not a firm has product, service or process innovation, in order to capture the possibility that previous innovation activity may support current exporting performance. Innovation translates to competitive advantage that will allow firms to compete in international markets (Vernon, 1966). Thus, innovation has long been recognised by the literature to encourage exporting (Higón and Driffield, 2010; Golovko and Valentini, 2011). In addition, we include four dummy variables capturing firms' internal capabilities. Firms' internal capabilities are considered as important factors driving them to export. For instance, exporting activities require firms to possess knowledge involving foreign technologies, international marketing, transportation, distribution and advertising (Matsuyama, 2007). More skill-intensive firms are capable of exporting to more developed markets because exporting to these locations require high quality products and supporting services

(Brambilla et al., 2012). The dummy variables capture whether a firm perceives itself to have strong or very strong capabilities for a) developing and implementing a business plan and strategy, b) developing and introducing new products or services, c) accessing external finance and d) operational improvement.

Thirdly, we examine the driving factors of firms' economic performance measured by (log) turnover per employee.

$$Performance_{it} = \gamma_0 + \gamma_1 * Aware_{it-1} + \gamma_2 * Advice + \gamma_3 * Plan_{it-1} + \gamma_4 * X_{1it-1} + \gamma_5 * X_{2it-1} + \gamma_6 * X_{3it-1} + \varepsilon_{3it} \quad (3)$$

where X_1 and X_2 are as defined in models (1) and (2). X_3 includes one-year lagged performance and export status. Competition from foreign competitors, as well as interaction with customers can encourage firms to reduce costs, raise product/service quality and increase sales (Greenaway and Kneller, 2007). Exporting therefore can be an important source of knowledge and impose competitive pressure to encourage SMEs to improve efficiency and performance (Martins and Yang, 2009; Love and Ganotakis, 2013). The phenomenon that firms learn through exporting activities and eventually obtain productivity gains is widely discussed in the learning-by-exporting literature (Tse et al., 2017). Vector X_2 is included because innovation provides opportunities for firms to achieve long-term economic benefits such as via building competitive advantages. Agile and entrepreneurial behaviour by SMEs may help them to tailor innovation activity to attract market niches and so gain economic returns (Rosenbusch et al., 2011). This model is estimated by ordinary least squares with standard errors clustered at firm level.

In each case pooled models are used because all the likelihood ratio tests show that panel model is not different from pooled model. This is unsurprising given that the panel element in LSBS consists of only two observations on each firm.

4.2 Matching models for business support as a treatment effect

As an alternative approach, we use propensity score matching to assess the causal effect of the key variables of interest on firm performance. Given that counterfactual outcomes are not observable, the idea of propensity score matching is to impute potential outcomes under the condition of control for a treatment group. Average treatment effect on the treated (ATT) can be expressed as:

$$E(w^1 - w^0 | treatment = 1) = E(w^1 | treatment = 1) - E(w^0 | treatment = 1)$$

where w^1 is an observable outcome and w^0 is the unobservable counterfactual outcome of the treated group. We examine three types of treatment: (1) gaining awareness of business support (*Aware*), (2) acquiring external advice or information (*Advice*), (3) using a formal business plan (*Plan*). The impact of each of these is investigated separately on each of the three outcomes: innovation, exporting activity and log turnover per employee. The key point of obtaining ATT is to establish a counterfactual case for the treated group (i.e. the control group).

We construct the following model to estimate the propensity score:

$$\Pr(treatment_i = 1) = \Phi(h(X_i))$$

where $\Phi(.)$ represents the cumulative density function of a normal distribution. X_i refers to firm i 's characteristics as the control variables that affect both the treatment and outcome. It includes the same set of variables as the ones used as explanatory variables in models 1 to 3 when estimating different sets of propensity scores for different outcomes.

Kernel matching is adopted because it gives the best matching quality and balances the variables between the treated and control groups. Kernel matching uses all individuals in the potential control sample and takes more information from those who are closer matches and weights down more distant observations. A bootstrapping approach is employed to obtain estimations of standard errors and 95% confidence intervals for the estimated average treatment effects for the treated.

Although the Kernel method is preferred, a bias-corrected matching estimator is also used to check the robustness of the results (and reported in the Appendix). This approach is chosen because it does not use logistic regression to predict propensity scores and hence requires fewer decisions about model structure and does not involve semi-parametric estimation of unknown matching functions (Guo and Fraser, 2015).

4.3 Covariates

The choice of covariates to explain other influences on firm performance is determined to some extent by the range of information available in the LSBS. A

dummy variable indicating whether or not a firm has multiple business sites is included in the model to capture information and knowledge obtained via internal organisational networks (Zhou and Li, 2012). Furthermore, a dummy variable indicating whether or not a firm is located in rural area is controlled for to capture place effects. This is because firm characteristics, development barriers and business strategies in rural or urban areas may differ (Lee and Cowling, 2015). In addition, older and larger firms are on average more resourceful, innovative and have better economic performance than younger and smaller firms (Atkeson and Kehoe, 2005). We control for firm size by categorising firms into three mutually exclusive groups: sole proprietorships (the base group in all estimations), those with between 1 and 4 employees, those with between 5 and 9 employees. Firm age is grouped into four bands: those less than 5 years old (the base group), those between 6 and 10 years old, those between 11 and 20 years old and those more than 20 years old. We also include regional and industry sector dummy variables in all estimations to control for any time-invariant heterogeneity in performance related to regional and industrial characteristics that may display common effects for firms within each group. Regional dummy variables are included for London and South East of England, Scotland, Wales and Northern Ireland, with the base group defined as firms located in the rest of England. The industry sector categorisation includes primary industries (the base group), manufacturing, construction and service sectors (wholesale/retailing, transport/storage, accommodation/food, information/communication, financial/real estate, professional/scientific, administrative/support, education, health/social work, arts/entertainment, other service).

5. FINDINGS

5.1 Multivariate analysis

Average marginal effects are reported in Table 2. Columns (1) and (2) report the estimation results for Model (1). There are a number of statistically significant associations. Micro-businesses that are aware of business support programmes are 3.4% more likely to have product/service/process innovation, compared with others that are unaware of any of the support programmes. The probability of having product/service/process innovation is 11.9% higher for micro-businesses that have a formal business plan those do not. Micro-businesses that use external advice and information are 11.5% more likely to have product/service/process

innovation compared with those that do not use any external advice and information. Size-wise, micro-businesses that employ between 1 to 4 people tend to be more likely to have innovated in the past three years. Firms that are more than 20 years old are less likely to have innovated. The results in column (2) are largely consistent with column (1), except that having multiple business sites is associated with firms being (3.4%) more likely to have new to the market product/service/process innovation, compared with those that only operate in one site.

Columns (3) to (7) report the estimation results for Model (2), with columns (3) to (5) estimated using the logit model for non-service sectors (i.e. primary, manufacturing and construction), service sectors and both sectors combined, respectively. Columns (6) to (7) are estimated using the Tobit model for non-service and service sectors, respectively. Again there are a number of statistically significant associations. Column (3) shows that non-service sector micro-businesses using external advice and information are 4.2% more likely to export goods compared with those do not use any external advice and information. Non-service sector micro-businesses that have product/service/process innovation are 6% more likely to export relatively to those do not have any form of innovation. Operating from multiple business sites increases the likelihood of exporting goods by 7.5% compared with those only operating via one business site. In comparison, column (4) shows that the driving factors for service sector micro-businesses to export are different from that in non-service sectors. More specifically, awareness of business support is associated with service sector micro-businesses being 4.2% more likely to export relative to those who are unaware of any support.

A high perceived capability to acquire finance discourages the exporting propensity of service sector micro-businesses. Although this finding may appear surprising, it may indicate that micro-businesses are reluctant to use external finance to support riskier activities such as exporting. Micro-businesses are faced with stronger external market constraints compared to larger firms (Ughetto, 2008) and if external finance is granted, they would might invest directly into growth. In our results, capability to acquire finance is positively related to productivity, although the effect is not significant. Furthermore, similar to non-service sector micro-businesses, the likelihood of service businesses engaging in exporting activity is significantly associated with innovation.

Columns (6) and (7) show that factors, which are associated with increased exporting propensity generally, are also associated at the same time with more intensive exporting. For instance, column (6) shows that non-service sector micro-businesses that use external advice and information have 1.8 percentage points higher export sales share than those who do not. Micro-businesses that are product/service/process innovators export 3 percentage points more goods than those who do not have any form of innovation. Operating multiple business sites is associated with significantly higher export intensity, by 4.4 percentage points relative to a business that has only one site. As for service sectors in column (7), awareness of business support is associated with more intensive exporting compared to those who are unaware of any support. A strong perceived capability to acquire external finance on the part of service sector micro-businesses is associated with lower export intensity. Engaging in product/service/process innovation is a strong factor associated with service sector micro-businesses exporting more. The results show an increase of 4 percentage points compared to non-innovators. In terms of location, the export intensity of micro-businesses in rural areas is 1.4 percentage points less than those located in other areas. Service sector micro-businesses aged between 6 and 10 years have slightly higher export intensities than those in other age bands.

Column (8) presents the estimation results for Model (3). By controlling for lagged turnover per employee, the model shows that business performance is dependent on past performance. Unlike in the previous results, awareness of business support, use of a formal business plan, as well as innovation activity, all appear to lose their importance for business performance in terms of being associated with improved productivity. However, firms that have a strong perceived capability for developing a business plan and strategies have statistically significantly higher productivity. Exporting activities and multiple-business sites are found to be significantly associated with the achievement of higher economic performance. This is consistent with some learning effect from exporting. Larger micro-businesses tend to have higher turnover per employee.

Table 3 further examines how using different types of external advice or information are associated with micro-businesses' performance. In this Table the dummy variable indicating whether or not a firm uses external advice or information is replaced with eight dummy variables which break that advice down into eight categories: business growth, marketing, employment issues, legal matters,

innovation, exporting activities, finance advice and management.³ Similar to Table 2, columns (1) and (2) report estimated marginal effects for model (1); columns (3) to (7) report estimated marginal effects for model (2) and column (8) shows the estimated regression coefficients for model (3). In the first two columns, using external business growth and marketing advice or information is associated with a significant improvement in the likelihood of being an innovator. External financial advice also marginally contributes to innovation activity. Column (3) shows that non-service sector micro-businesses that used advice or information about employment issues are more likely to export goods. External marketing advice is significantly associated with improved propensity to export in column (5). Consistent with Robson and Bennett (2000,) who have observed different effects from using various types of external advice, these findings also suggest that most fields of external advice are not significantly associated with improved outcomes. However, advice on business growth, marketing and employment issues does appear to contribute to improved propensities of innovation and exporting.

5.2 Treatment effects

Table 4 presents estimated average treatment effects on the treated (ATT) for the different business performance outcomes under each of the ‘treatments’. Alternative estimates using a bias-corrected matching estimator are reported in the Appendix (Table A1). The Appendix also reports aggregate balancing indicators for the models reported in Table 4 (Table A2), which show a high level of success achieved in the matching process to balance differences in the covariates between treated and control groups. The first indicator is the mean standardised bias (i.e. mean bias before and after) over all covariates used in the propensity scores. For example, for the treatment of awareness of business support, the mean standardised bias is between 8% and 13% before matching and drops to between 1% and 3% after matching. The second indicator is the pseudo R^2 before and after matching. A low value of this indicator suggests that there are little systematic differences in the distributions of covariates between the treated and control group. In the first case, the pseudo R^2 is just above 0.05 before matching and falls to nearly zero (between 0.002 to 0.006) after matching. Additionally, from the

³ The rest of the explanatory variables are the same as that in Table 2. The results for the other explanatory variables are very similar to that in Table 2 and therefore not presented here to save space.

reported p-values it can be seen that there are no statistically significant differences in the covariates between the treated and control groups. Therefore, the treated and control groups are well balanced after matching.

Micro-businesses that are aware of business support have a higher probability (by 0.029 or 2.9 percentage points) of having new to the market innovation compared to micro-businesses that are unaware of any business support. This effect is statistically significantly different from zero, such that the 95% confidence interval of a non-zero effect of awareness of business support on the probability of having new to the market innovation between treated and control groups falls into the range of 0.0003 to 0.058. For exporting propensity, for example exporting goods and/or services, the average treatment effect for the treated is 0.051. This means that micro-businesses who are aware of business support have a 5.1 percentage points higher probability of exporting goods and/or services compared to the control group, after controlling for observed covariates. This effect is statistically significantly different from zero at the 5% level. The treatment effects of having a formal business plan and of using external advice or information are statistically significant only for the innovation outcomes. They vary in size between 4 and 13 percentage points. There are no beneficial effects from both having a formal business plan and using external advice or information on propensity to export or on (log) turnover per employee. In fact, we find no significant treatment effects on micro-business productivity performance from any of these ‘treatments’. In summary, these findings are largely consistent with the regression results reported in Table 2 and Table 3.

As noted above, Table A1 provides additional estimates of ATTs using an alternative estimator, bias-corrected matching with heteroscedasticity-consistent standard errors. Both Kernel matching and bias-corrected matching estimators lead to a consistent conclusion that, at least for these data, we find that the benefits of the three types of treatment are mainly captured by innovation and not at all by turnover per employee. Awareness of business support can boost exporting activities, but any effect on exporting propensity is largely non-existent under the other two types of treatments, use of a formal business plan or of business advice and support.

6. DISCUSSION

Despite their small size, low levels of innovativeness and internationalisation, UK micro-businesses are surprisingly (or perhaps, depressingly) positive in their self-assessment of their business capabilities. Over half of all businesses in the first survey wave in 2015 self-assess as having strong or very strong capabilities for planning and strategy, for introduction of new products or services and for operational improvement. It is only in the capability to acquire finance that the majority of micro-businesses feel that their capacity is weak. Levels of awareness of business support appear also to be quite high, at over 60% in the first wave. Almost half of micro-businesses claim to have a formal business plan (although the primary purpose of these may have been to support applications for bank finance). To square these data with the lower reported proportions of firms who are innovative or internationalized, suggests some degree of psychological 'affect' or optimism bias (Dawson et al., 2014). Although almost 50% of micro-business in 2015 and 37% in 2016 report undertaking some form of product or process innovation in the past three years, levels of new-to-market innovation are considerably lower at 17% in 2015 and 11% in 2016. The drop in both of these statistics between the two years might also give some cause for concern, but needs further investigation to assess the extent to which it is affected by attrition or survivor bias in the longitudinal sample. Even so, micro-business innovators, if they are also risk-takers, may have less chance of survival. Rates of internationalization are considerably lower at around 9% for goods exporting propensity and 13% for services exporting propensity. In both cases, again, rates have fallen between 2015 and 2016.

So there is considerable scope for supporting micro-businesses in their development and growth over these two domains. Overall, just under a third of micro-businesses sought external information or advice in 2015. This support is spread across a range of strategic and operational areas rather than being just focused on, say, marketing or finance. It is perhaps encouraging that the most popular form of information or advice sought is for business growth, but the absolute numbers show that in fact only 4% of micro-businesses sought help for this purpose. Levels of advice sought explicitly for innovation or exporting purposes are very low. One might summarise these headline data as suggesting a significant

level of 'disconnect' between the perceived capabilities of UK micro-businesses and their actual practice or performance.

The econometric analysis in the report sheds further light in two particular areas. The first is on the causal chain between business support and performance. The second is to quantify the impact of business support on performance. In respect of the first of these, Figure 1 provides a conceptual summary of the main findings based on Table 2, with the causal links in the flow chart indicating significantly positive effects at the 95% confidence level. It shows whether the performance of micro-businesses is associated with formal planning practice, with awareness of business support and use of external advice. Having a formal business plan is associated with a higher propensity to innovate, but does not appear to improve propensity to enter export markets or raise productivity. Such different effects are consistent with findings reported in Brinckmann et al. (2010), and highlight the importance of examining a range of performance indicators. Our findings suggest that having a formal business plan may not have a direct impact on economic performance as the 'learning school' suggests, but may affect firm performance via other channels such as innovation which will eventually contribute to improved economic performance (measured by turnover per employee). This contributes to the literature examining the relationship between business planning, innovation and exporting success in micro-businesses, to some extent filling in the gaps highlighted by Love and Roper (2015).

In addition, seeking and making use of external advice appears to help micro-businesses to generate innovation, but has no impact on exporting activity or productivity. This is not consistent with previous studies such as Berry et al. (2006) that observe a positive relationship between using external advice and higher turnover. Our finding implies that micro-businesses may be better at seeking and internalising external advice to close gaps in knowledge and management expertise, but may not be effective in directly commercialising such knowledge to generate turnover. One further point to note, drawing from the more details results breakdown in Table 3, is that improved innovation activity is not necessarily associated explicitly with advice or support which is directly about innovation. Business support which operates to raise to overall salience of business growth may be as, if not more, effective. Encouraging micro-businesses to become more growth-orientated may led them to identify for themselves appropriate action in terms or product, service, process or organisational innovation. This is the logic

behind the apparent effectiveness of ‘slow-burn’ small business leadership development activity (see, for example, Wren and Jones, 2012).

Moreover, awareness of government support is not only directly associated with higher levels of innovativeness on the part of micro-businesses, but may also encourage them to enter international markets via exporting activity. Simple knowledge awareness in itself is unlikely to have a direct causal impact – that awareness needs to be acted on. We propose that awareness of government support here captures the extent to which micro-business owner-managers display stronger levels of motivation to compete and entrepreneurial orientation than others. Therefore, they may proactively seek support (from non-governmental as well as governmental sources) and opportunities that potentially can assist them achieve growth goals. Even if the benefits of such awareness are not captured by improved turnover in the domestic market, exporting sales may increase as a result. It might perhaps be useful for future waves of the LSBS to explore in greater detail the characteristics of micro-business owner-managers, as even basic levels of information, such as demographic characteristics (gender, age, educational qualifications) are currently not obtained in the survey instruments.

Innovation by micro-businesses is associated with exporting activity. It helps them tap into overseas markets which then contribute in turn to higher turnover (see Figure 1). The benefits of formal planning practice, use of external advice and awareness of business support on improved productivity operating indirectly via innovation and exporting activities. This finding expands the work of previous studies by connecting previously isolated research by illustrating the recursive process underpinning how micro-businesses can improve economic performance. Internal efforts in the form of formal business planning, seeking external support (such as collecting information on government support schemes), together with the use of external expertise appear to best directed towards support for innovation, rather than directly targeted towards promoting internationalisation or productivity performance. Innovation success will then enable micro-businesses to expand into international markets and achieve higher turnover and labour productivity. The competitive discipline of selling overseas may focus micro-businesses on the effective use of available labour resources. These findings have potential implications for the targeting of micro-business support activity, but these implications will need further examination perhaps through case study work or careful and robust evaluation of specific business support interventions.

The availability of two waves of LSBS data allows us to address the potential endogeneity issues which plague cross-sectional analysis, by using one-year lagged explanatory variables in our regression estimations. As the LSBS data builds up it will allow further scope for a more robust analysis of causality, as opposed to identifying statistical associations in the data.

The second area of econometric analysis in this report supports this task, by conducting a further set of robust checks through the examination of average treatment effects on the treated using propensity score matching methods. This provides further support for the conceptualisation described in Figure 1. The ATT findings expand the literature on innovation, exporting and SMEs performance which typically employs cross-sectional data, this limiting the ability to address inter-dependence and self-selection in these relationships (Ganotakis and Love, 2012). Our findings in this area might also be seen as an extension to other earlier work, notably Foreman-Peck (2013). Foreman-Peck uses a different UK data source, designed to look at R&D capacity in SMEs who are above the micro-business definitional threshold of less than 10 employees. The specific issue under investigation is the provision of R&D financial support through tax credits, which is found through propensity score matching and treatment analysis to be associated improved performance. However, he also notes that this form of state R&D support may (at the time of analysis, 2002-2004) represent a relatively expensive means of promoting SME development. In times of austerity in public funding the challenge is not only to identify what works in terms of where to target, but also to assess the cost-benefit effectiveness of interventions designed to promote growth among the smallest of businesses.

7. CONCLUSIONS

The UK Longitudinal Small Business Survey, as it builds up, is beginning to offer a unique opportunity for robust analysis of a range of aspect of performance of small businesses. The size and design of the overall sample makes it particularly well-suited, in comparison to previous datasets, to the study of sole-proprietorships and micro-businesses. To date researchers have had to rely on household surveys to analyse sole-proprietorships. These data sources are relatively rich on the characteristics and background of the (self-employed) business owner, but contain very sparse data on business activity and performance. This report has examined the specific issues of business capability and awareness and access to business

support amongst this large, but relatively neglected group of businesses. The results suggest that linkages between business support and subsequent business performance are rather weak. They appear to operate largely through innovation activity, and then indirectly through to the other domains of business performance, exporting activity and productivity (turnover per employee).

The key findings are supported through both multiple regression analysis and propensity score matching treatment analysis. Micro-businesses who have formal business plans, use external advice or information and have awareness of governmental business support are more likely to be innovative, but not necessarily directly more internationalised or productive. Micro-businesses do however appear to benefit indirectly from business planning and support awareness and activity from a learning effect on to exporting behaviour which in turn is associated with improvements in productivity. We conclude from this that business planning and support activity for micro-businesses requires careful targeting, with particular focus on innovation as a route to business growth. The case for targeting depends on two particular issues – firstly that overall the proportion of innovate micro-businesses is small, and secondly that the quantitative impact of business planning or use of external advice as ‘treatments’ are also small in absolute size, perhaps raising the likelihood of innovating by between 4 and 13 percentage points. Nevertheless careful targeting of support could see quantitatively significant indirect effects through to higher business productivity performances in particular micro-businesses.

REFERENCES

- Ansoff, H. 1991. Critique of Henry Mintzberg's 'the Design School': Reconsidering the Basic Premises of Strategic Management'. *Strategic Management Journal*, 12(6): 449-461.
- Armstrong, J. 1982. The value of formal planning for strategic decisions: review of empirical research. *Strategic Management Journal*, 3(3): 197-211.
- Atkeson, A. and Kehoe, P. 2005. Modeling and measuring organization capital. *Journal of Political Economy*, 113(5): 1026-1053.
- Baker, W., Grinstein, A. and Harmancioglu, N. 2016. Whose innovation performance benefits more from external networks: entrepreneurial or conservative firms? *Journal of Product Innovation Management*, 33(1): 104-120.
- BEIS 2017. *Longitudinal Small Business Survey Year 2 (2016): Technical Appendix*, London: Department for Business, Energy and Industrial Strategy (August).
- Bennett, R. and Robson, P. 2003. Changing use of external business advice and government supports by SMEs in the 1990s. *Regional Studies*, 37(8): 795-811.
- Berry, A., Sweeting, R. and Goto, J. 2006. The effect of business advisers on the performance of SMEs. *Journal of Small Business and Enterprise Development*, 13(1): 33-47.
- BIS 2016. *Longitudinal Small Business Survey Year 1 (2015): Technical Appendix*, London: Department for Business, Innovation and Skills (May).
- Brambilla, I., Lederman, D. and Porto, G. 2012. Exports, export destinations and skills^[LSEP]. *American Economic Review*, 102(7): 3406-3438.
- Brinckmann, J., Grichnik, D. and Kapsa, D., 2010. Should entrepreneurs plan or just storm the castle? A meta-analysis on contextual factors impacting the business planning–performance relationship in small firms. *Journal of Business Venturing*, 25(1): 24-40.
- Broughton, N. and Felici, M. 2016. The contribution of alternative finance to business growth. ERC Research Paper 51.
- Brunswick, S. and Vanhaverbeke, W. 2015. Open innovation in small and medium-sized enterprises (SMEs): external knowledge sourcing strategies and internal organizational facilitators. *Journal of Small Business Management*, 53(4): 1241-1263.
- Chrisman, J. and McMullan, W. 2004. Outsider assistance as a knowledge resource for new venture survival. *Journal of Small Business Management*, 42(3): 229-244.
- Cohen, W. and Levinthal, D. 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1): 128-152.
- Dawson, C., de Meza, D., Henley, A. and Arabsheibani, G.R. 2014. Entrepreneurship: cause and consequence of financial optimism? *Journal of Economics and Management Strategy*, 23(4): 717-742.

- Delmar, F. and Shane, S. 2003. Does business planning facilitate the development of new ventures?. *Strategic Management Journal*, 24(12): 1165-1185.
- Dibrell, C., Craig, J. and Neubaum, D. 2014. Linking the formal strategic planning process, planning flexibility and innovativeness to firm performance. *Journal of Business Research*, 67(9): 2000-2007.
- Doh, S. and Kim, B. 2014. Government support for SME innovations in the regional industries: the case of government financial support program in South Korea. *Research Policy*, 43(9): 1557-1569.
- Foreman-Peck, J. 2013. Effectiveness and efficiency of SME innovation policy. *Small Business Economics*, 41(1): 55-70.
- Ganotakis, P. and Love, J. 2012. The innovation value chain in new technology-based firms: evidence from the U.K.. *Journal of Production Innovation Management*, 29(5): 839-860.
- Gkypali, A. and Roper, S. 2017. Home alone: innovation and sales growth intentions among the sole self-employed. ERC Research Paper 59.
- Goll[^L_{SEP}], I. and Rasheed[^L_{SEP}], A. 1997. Rational decision-making and firm performance: the moderating role of environment. *Strategic Management Journal*, 18(7): 583-591.
- Golovko, E. and Valentini, G. 2011. Exploring the complementarity between innovation and export for SMEs' growth. *Journal of International Business Studies*, 42(3): 362-380.
- Greenaway, D. and Kneller, R. 2007. Firm heterogeneity, exporting and foreign direct investment. *The Economic Journal*, 117(517): F134-F161.
- Gruber, M., MacMillan, I. and Thompson, J. 2008. Look before you leap: market opportunity identification in emerging technology firms. *Management Science*, 54(9): 1652-1665.
- Guan, J. and Yam, R. 2015. Effects of government financial incentives on firms' innovation performance in China: evidences from Beijing in the 1990s. *Research Policy*, 44(1): 273-282.
- Guo, S. and Fraser, M. 2015. *Propensity Score Analysis – Statistical Methods and Applications*. 2nd Edition. California: SAGE Publications, Inc.
- Hayter, C.S. 2013. Conceptualizing knowledge-based entrepreneurship networks: perspectives from the literature. *Small Business Economics* 41(4): 899-911.
- Henley, A. (2016), Who and where are the self-employed job creators? *unpublished conference paper*, Institute for Small Business and Entrepreneurship 39th Annual Conference, Paris.
- Hewitt-Dundas, N. and Roper, S. 2010. Output additionality of public support for innovation: evidence for Irish manufacturing plants. *European Planning Studies*, 18(1): 107-122.
- Higón, D. and Driffield, N. 2011. Exporting and innovation performance: analysis of the annual Small Business Survey in the UK. *International Small Business Journal*, 29(1): 4-24.

- Johnston, A., Prokop, D., Crone, M., Masango, S. and Lassalle, P. 2017. Assessing the characteristics, determinants and spatial variations of internationalised new ventures in the UK. ERC Research Paper 56.
- Knight, G. and Cavusgil, S. 2004. Innovation, organizational capabilities and the born-global firm. *Journal of International Business Studies*, 35(2): 124-141.
- Koryak, O., Mole, K., Lockett, A., Hayton, J., Ucbasaran, D. and Hodgkinson, G. 2015. Entrepreneurial leadership, capabilities and firm growth. *International Small Business Journal*, 33(1): 89-105.
- Lee, N. and Cowling, M. 2015. Do rural firms perceive different problems? Geography, sorting and barriers to growth in UK SMEs. *Environment and Planning C: Government and Policy*, 33(1): 25-42.
- Love, J. and Ganotakis, P. 2013. Learning by exporting: lessons from high-technology SMEs. *International Business Review*, 22(1): 1-17.
- Love, J. and Roper, S. 2015. SME innovation, exporting and growth: a review of existing evidence. *International Small Business Journal*, 33(1): 28-48.
- Martins, P. and Yang, Y. 2009. The impact of exporting on firm productivity: a meta-analysis of the learning-by-exporting hypothesis. *Review of World Economics*, 145(3): 431-445.
- Matsuyama, K. 2007. Beyond icebergs: towards a theory of biased globalization. *Review of Economic Studies*, 74(1): 237-253.
- Mention, A. 2011. Co-operation and co-opetition as open innovation practices in the service sector: Which influence on innovation novelty?. *Technovation*, 31(1): 44-53.
- Miller, C. and Cardinal, L. 1994. Strategic planning and firm performance: a synthesis of more than two decades of research. *Academy of Management Journal*, 37(6): 1649-1665.
- Minniti, M. 2005. Entrepreneurship and network externalities. *Journal of Economic Behavior and Organization* 57:1-27.
- Mintzberg, H. 1978. Patterns in strategy formation. *Management Science*, 24(9): 934-948.
- Moen, O., Heggseth, A. and Lome, O. 2016. The positive effect of motivation and international orientation on SME growth. *Journal of Small Business Management*, 54(2): 659-678.
- Mole, K., North, D. and Baldock, R. 2017. Which SMEs seek external support? Business characteristics, management behaviour and external influences in a contingency approach. *Environment and Planning C: Politics and Space*, 35(3): 476-499.
- Mosakowski, E. 1997. Strategy making under causal ambiguity: conceptual issues and empirical evidence. *Organization Science*, 8(4): 414-442.
- Owen, R., Botelho, T. and Anwar, O. 2016. Exploring the success and barriers to SME access to finance and its potential role in achieving growth. ERC Research Paper 53.

- Rao, N. 2016. Do tax credits stimulate R&D spending? The effect of the R&D tax credit in its first decade. *Journal of Public Economics*, 140: 1-12.
- Robertson, P., Casali, G. and Jacobson, D. 2012. Managing open incremental process innovation: absorptive capacity and distributed learning. *Research Policy*, 41(5): 822-832.
- Robson, P. and Bennett, R. 2000. SME growth: the relationship with business advice and external collaboration. *Small Business Economics*, 15(3): 193-208.
- Rosenbusch, N., Brinckmann, J. and Bausch, A. 2011. Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, 26(4): 441-457.
- Sirén, C. and Kohtamäki, M. 2016. Stretching strategic learning to the limit: The interaction between strategic planning and learning. *Journal of Business Research*, 69(2): 653-663.
- Sullivan, D. and Marvel, M. 2011. How entrepreneurs' knowledge and network ties relate to the number of employees in new SMEs. *Journal of Small Business Management*, 49(2): 185-206.
- Terziovski, M. 2010. Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: a resource-based view. *Strategic Management Journal*, 31(8): 892-902.
- Thornton, P.H. and Flynn, K.H. 2003. Entrepreneurship, network and geographies, in (eds.) Acs, Z.J. and Audretsch, D.B. *Handbook of Entrepreneurship Research*, Boston MA: Springer: 401-433.
- Tortoriello, M. 2015. The social underpinnings of absorptive capacity: the moderating effects of structural holes on innovation generation based on external knowledge. *Strategic Management Journal*, 36(4): 586-597.
- Tse, C., Yu, L. and Zhu, J. 2017. A multimediation model of learning by exporting: analysis of export-induced productivity gains. *Journal of Management*, 43(7): 2118-2146.
- Ughetto, E. 2008. Does internal finance matter for R&D? New evidence from a panel of Italian firms. *Cambridge Journal of Economics*, 32(6): 907-925.
- Van Doorn, S., Heyden, M. and Volberda, H. 2017. Enhancing entrepreneurial orientation in dynamic environments: the interplay between top management team advice-seeking and absorptive capacity. *Long Range Planning*, 50(2): 134-144.
- Van Stel, A. and Storey, D.J. 2004. The link between firm births and job creation: Is there a Upas tree effect? *Regional Studies* 38: 893-909.
- Vernon, R. 1966.  International investment and international trade in the product cycle. *Quarterly Journal of Economics*, 80(2): 190-207.
- Wiklund, J., Patzelt, H. and Shepherd, D. 2009. Building an integrative model of small business growth. *Small Business Economics*, 32(4): 351-374.
- Wiltbank, R., Dew, N., Read, S. and Sarasvathy, S. 2006. What to do next? The case for non-predictive strategy. *Strategic Management Journal*, 27(10): 981-998.

Wolf, C. and Floyd, S. 2017. Strategic planning research: toward a theory-driven agenda. *Journal of Management*, 43(6): 1754-1788.

Wren, C. and Jones, J. 2012. *Quantitative Evaluation of the LEAD Programme, 2004-11*, Institute for Entrepreneurship and Enterprise Development, Lancaster University <https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lums/business/LEADeval2011.pdf> (accessed 26-2-2018).

Zhou, K. and Li, C. 2012. How knowledge affects radical innovation: knowledge base, market knowledge acquisition and internal knowledge sharing. *Strategic Management Journal*, 33(9): 1090-1102.

Table 1: Summary statistics

Variable	Wave 1 (2015)					Wave 2 (2016)				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
<i>Business Performance:</i>										
Has goods/services/process innovation (0/1)	3,859	0.495	0.500	0	1	3,994	0.368	0.482	0	1
Has new to the market innovation (products/services/processes)	3,820	0.165	0.371	0	1	3,968	0.110	0.313	0	1
Export goods (0/1)	3,876	0.088	0.283	0	1	4,008	0.081	0.273	0	1
Export services (0/1)	3,871	0.126	0.332	0	1	4,005	0.115	0.319	0	1
Export goods and/or services (0/1)	3,869	0.191	0.393	0	1	4,005	0.174	0.379	0	1
Export sales from goods	3,468	2.211	11.220	0	100	3,628	2.083	11.088	0	100
- Export sales from goods among goods exporters	339	22.619	28.778	1	100	320	23.613	29.798	1	100
Export sales from services	3,610	3.617	14.930	0	100	3,758	3.658	15.352	0	100
- Export sales from services among service exporters	481	27.150	32.183	1	100	449	30.393	33.772	1	100
Log turnover per employee	2,942	11.198	1.240	4.615	17.034	3,256	11.139	1.232	2.398	18.133
<i>Self-assessed business capabilities:</i>										
Capability for business plan/strategy (0/1)	3,771	0.578	0.494	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Capability for new products/services (0/1)	3,536	0.553	0.497	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Capability to acquire finance (0/1)	2,781	0.393	0.489	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Capability for operational improvement (0/1)	3,661	0.657	0.475	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
<i>Business support and planning:</i>										
Use information or advice (0/1)	3,869	0.316	0.465	0	1	3,990	0.230	0.421	0	1
- for business growth	3,869	0.039	0.192	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
- for legal matters	3,869	0.029	0.169	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
- for finance advice	3,869	0.024	0.153	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
- for employment issues	3,869	0.023	0.151	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
- for marketing	3,869	0.017	0.129	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
- for management	3,869	0.003	0.056	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
- for exporting activities	3,869	0.002	0.048	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
- for innovation	3,869	0.002	0.043	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Aware of business support (0/1)	3,882	0.613	0.487	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Has a business plan (0/1)	3,838	0.359	0.480	0	1	3,979	0.466	0.499	0	1
<i>Business characteristics and sector:</i>										
Has multiple business sites (0/1)	3,857	0.085	0.279	0	1	3,984	0.095	0.293	0	1
Rural area (0/1)	3,869	0.318	0.466	0	1	4,008	0.311	0.463	0	1
Employees 0 (0/1) (base group: sole proprietorship)	3,882	0.490	0.500	0	1	4,009	0.413	0.492	0	1
Employees 1-4 (0/1)	3,882	0.325	0.468	0	1	4,009	0.372	0.483	0	1
Employees 5-9 (0/1)	3,882	0.184	0.388	0	1	4,009	0.215	0.411	0	1

Firm age 1-5 years (0/1) (base group)	3,875	0.145	0.352	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Firm age 6-10 years(0/1)	3,875	0.147	0.354	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Firm age 11-20 (0/1)	3,875	0.196	0.397	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
Firm age >20 (0/1)	3,875	0.513	0.500	0	1	N.A.	N.A.	N.A.	N.A.	N.A.
ABDE – Primary (base group)	3,882	0.055	0.228	0	1	4,009	0.054	0.226	0	1
C - Manufacturing	3,882	0.065	0.246	0	1	4,009	0.066	0.248	0	1
F - Construction	3,882	0.112	0.316	0	1	4,009	0.110	0.313	0	1
G - Wholesale/ Retail	3,882	0.145	0.352	0	1	4,009	0.141	0.349	0	1
H - Transport/ Storage	3,882	0.033	0.180	0	1	4,009	0.032	0.176	0	1
I - Accommodation/ Food	3,882	0.044	0.204	0	1	4,009	0.040	0.197	0	1
J - Information/ Communication	3,882	0.071	0.257	0	1	4,009	0.072	0.259	0	1
KL - Financial/ Real Estate	3,882	0.043	0.202	0	1	4,009	0.044	0.204	0	1
M - Professional/ Scientific	3,882	0.219	0.414	0	1	4,009	0.217	0.412	0	1
N - Administrative/ Support	3,882	0.057	0.233	0	1	4,009	0.062	0.241	0	1
P - Education	3,882	0.035	0.184	0	1	4,009	0.036	0.187	0	1
Q - Health/ Social Work	3,882	0.039	0.195	0	1	4,009	0.042	0.202	0	1
R - Arts/ Entertainment	3,882	0.028	0.166	0	1	4,009	0.029	0.167	0	1
S - Other service	3,882	0.053	0.224	0	1	4,009	0.054	0.226	0	1
<i>Business location:</i>										
Rest of the England (0/1) (base group)	3,882	0.579	0.494	0	1	4,009	0.581	0.494	0	1
Scotland (0/1)	3,882	0.073	0.261	0	1	4,009	0.072	0.258	0	1
Wales (0/1)	3,882	0.031	0.173	0	1	4,009	0.032	0.176	0	1
Northern Ireland (0/1)	3,882	0.032	0.176	0	1	4,009	0.033	0.178	0	1
London and South East of England	3,882	0.285	0.451	0	1	4,009	0.283	0.450	0	1

Table 2: Multiple Regression Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV: whether or not has product/service/process innovation (Logit)	DV: whether or not has new to the market innovation (products/services/processes) (Logit)	DV: export goods (0/1) (Logit)	DV: export services (0/1) (Logit)	DV: export goods and/or services (0/1) (Logit)	DV: export sales from goods (Tobit)	DV: export sales from services (Tobit)	DV: Turnover per employee in logarithm form (OLS)
Aware of business support (0/1)	0.034**	0.021*	0.005	0.042***	0.046***	0.969	1.778**	0.030
	-0.016	-0.011	-0.024	-0.016	-0.015	-1.126	-0.697	-0.038
Has a business plan (0/1)	0.119***	0.048***	0.034	0.004	0.015	1.931*	-0.200	0.032
	-0.015	-0.011	-0.024	-0.015	-0.015	-1.111	-0.673	-0.038
Use information or advice (0/1)	0.115***	0.044***	0.042*	0.010	0.016	1.893*	0.345	0.037
	-0.016	-0.011	-0.023	-0.014	-0.014	-1.132	-0.660	-0.040
Capability for business plan/strategy (0/1)			0.034	0.000	0.025	1.194	0.763	0.096**
			-0.028	-0.015	-0.015	-1.132	-0.704	-0.038
Capability for new products/services (0/1)			0.040	-0.005	0.006	1.210	-0.054	0.033
			-0.028	-0.015	-0.015	-1.211	-0.657	-0.037
Capability to acquire finance (0/1)			-0.009	-0.044***	-0.044***	-1.236	-2.389***	0.014
			-0.022	-0.016	-0.015	-1.076	-0.697	-0.039
Capability for operational improvement (0/1)			0.003	-0.010	-0.033**	0.572	-0.884	0.020
			-0.026	-0.015	-0.015	-1.102	-0.686	-0.037
Has goods/services/process innovation (0/1)			0.060*	0.094***	0.100***	3.164***	3.946***	0.008
			-0.024	-0.016	-0.015	-1.210	-0.691	-0.036
Exporting goods/services (0/1)								0.094**
								-0.043
Lagged turnover per employee								0.714***
								-0.027
Has multiple business sites (0/1)	0.016	0.034**	0.075*	0.006	0.012	4.391***	-0.490	0.164**
	-0.026	-0.015	-0.034	-0.025	-0.024	-1.460	-1.062	-0.072
Rural area (0/1)	-0.014	0.018*	0.035	-0.026	-0.009	0.736	-1.431*	0.069*
	-0.017	-0.011	-0.022	-0.016	-0.015	-1.134	-0.738	-0.038
Employees 1-4 (0/1) (base group: sole proprietorship)	0.051***	0.017	-0.029	0.013	0.009	-1.099	0.296	-0.006
	-0.017	-0.011	-0.026	-0.016	-0.015	-1.174	-0.688	-0.039
Employees 5-9 (0/1)	0.033	-0.005	0.009	-0.002	0.021	0.011	-0.569	0.191***
	-0.023	-0.016	-0.030	-0.024	-0.021	-1.362	-1.076	-0.047
Firm age 6-10 years (0/1) (base group: 1-5 years)	0.006	-0.015	-0.070	0.037*	0.045**	-0.190	1.916*	-0.055

	-0.027	-0.017	-0.045	-0.022	-0.023	-2.056	-1.002	-0.063
Firm age 11-20 (0/1)	0.025	0.018	-0.012	0.014	0.017	0.286	0.695	-0.042
	-0.025	-0.016	-0.037	-0.022	-0.023	-1.847	-1.015	-0.053
Firm age >20 (0/1)	-0.052**	-0.034**	0.001	0.019	0.017	0.863	0.950	-0.067
	-0.022	-0.015	-0.030	-0.019	-0.020	-1.648	-0.880	-0.050
C – Manufacturing (base group: primary sectors)	0.173***	0.099***	0.156**		0.182***	7.045***		-0.186**
	-0.043	-0.029	-0.031		-0.044	-1.535		-0.095
F - Construction	-0.091**	0.001	-0.111*		-0.132**	-5.061**		0.011
	-0.042	-0.030	-0.047		-0.056	-2.063		-0.085
G - Wholesale/ Retail	0.010	0.020			0.121***			-0.075
	-0.040	-0.029			-0.043			-0.089
H - Transport/ Storage	-0.076	-0.111*		0.072	0.032		1.907	-0.224**
	-0.057	-0.060		-0.047	-0.059		-2.002	-0.088
I - Accommodation/ Food	-0.033	-0.128**		-0.147	-0.196**		-5.498*	-0.302***
	-0.053	-0.059		-0.101	-0.094		-3.125	-0.094
J - Information/ Communication	0.225***	0.092***		0.182***	0.159***		7.385***	-0.273***
	-0.043	-0.029		-0.028	-0.044		-1.209	-0.093
KL - Financial/ Real Estate	-0.061	-0.051		0.008	-0.090		-0.810	-0.059
	-0.050	-0.039		-0.047	-0.064		-1.908	-0.116
M - Professional/ Scientific	0.076**	0.052*		0.139***	0.097**		4.985***	-0.198**
	-0.038	-0.027		-0.026	-0.042		-1.077	-0.081
N - Administrative/ Support	-0.004	0.002		0.067*	0.020		2.683*	0.216
	-0.046	-0.033		-0.036	-0.050		-1.444	-0.136
P - Education	0.005	0.012		0.028	-0.060		0.292	-0.498***
	-0.053	-0.037		-0.048	-0.066		-1.909	-0.106
Q - Health/ Social Work	0.059	0.014		-0.176*	-0.180**		-7.351**	-0.192
	-0.049	-0.036		-0.100	-0.080		-3.360	-0.126
R - Arts/ Entertainment	0.101*	0.003		0.111***	0.081		3.365*	-0.361***
	-0.054	-0.041		-0.041	-0.054		-1.764	-0.131
S - Other service	0.023	0.020		0.042	0.003		0.315	-0.270**
	-0.046	-0.033		-0.038	-0.051		-1.645	-0.111
Scotland	-0.042	0.025	-0.011	0.029	0.015	-0.449	1.595	-0.048
	-0.030	-0.018	-0.037	-0.028	-0.027	-2.116	-1.202	-0.068
Wales	0.018	0.052**	0.036	-0.036	0.033	1.759	-1.182	-0.155*
	-0.043	-0.026	-0.034	-0.055	-0.039	-2.348	-2.329	-0.087
Northern Ireland	-0.020	-0.032	0.102*	0.069**	0.107***	4.952**	2.640*	-0.113
	-0.042	-0.031	-0.047	-0.033	-0.031	-1.953	-1.534	-0.071
London and South East of England	0.015	0.017	0.064*	0.043***	0.061***	2.519**	1.895***	0.053

	-0.017	-0.011	-0.027	-0.015	-0.015	-1.250	-0.674	-0.041
Log likelihood	-2382.928	-1244.379	-137.452	-640.085	-995.508	-434.005	-1686.301	
Pseudo R2	0.070	0.075	0.372	0.156	0.155	0.158	0.065	
Wald chi2	319.430	195.140	96.580	177.430	289.110			
LR chi2						162.260	235.130	
Constant								3.171***
								-0.303
Observations	3894	3869	621	2007	2628	610	1904	1900
R-squared								0.633

Notes: Average marginal effects are reported in columns (1)-(8). Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; (2) All the explanatory variables are one year lagged except for the industry and location dummies.

Table 3: The Impact of Different Types of Advice or Information Used on Performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV: whether or not has product/service/innovation (Logit)	DV: whether or not has new to the market innovation (products/services/processes) (Logit)	DV: export goods (0/1) (Logit)	DV: export services (0/1) (Logit)	DV: export goods and/or services (0/1) (Logit)	DV: export sales from goods (Tobit)	DV: export sales from services (Tobit)	DV: Turnover per employee in logarithm form (OLS)
Aware of business support (0/1)	0.041* **	0.022**	0.011	0.039**	0.044***	1.230	1.630**	0.031
	-0.016	-0.011	-0.023	-0.016	-0.015	-1.122	-0.699	-0.038
Has a business plan (0/1)	0.131* **	0.050***	0.042*	0.009	0.020	2.128*	-0.034	0.036
	-0.015	-0.011	-0.024	-0.015	-0.015	-1.112	-0.675	-0.038
<i>Used advice or information:</i>								
- for business growth	0.124* **	0.0422*	-0.036	-0.024	0.002	-0.045	-0.511	-0.053
	-0.044	-0.024	-0.063	-0.039	-0.036	-2.464	-1.774	-0.096
- for marketing	0.136* *	0.000	0.011	0.035	0.118**	-1.977	-0.612	-0.107
	-0.065	-0.038	-0.065	-0.045	-0.047	-6.474	-2.143	-0.125
- for employment issues	-0.011	-0.008	0.164***	-0.047	0.006	4.287	-1.751	0.196
	-0.054	-0.031	-0.054	-0.053	-0.046	-3.363	-2.225	-0.127
- for legal matters	-0.009	0.021	-0.051	0.038	0.024	4.336	2.351	0.116
	-0.047	-0.028	-0.050	-0.038	-0.039	-3.729	-1.849	-0.112
- for innovation	-0.160	0.053		0.134	0.232*		2.194	-0.018
	-0.191	-0.091		-0.166	-0.121		-10.290	-0.314
- for exporting activities	0.022	0.011		0.082	0.051		6.579	0.243
	-0.153	-0.063		-0.133	-0.117		-5.611	-0.325
- for finance advice	0.083* *	0.050*	0.000	0.033	-0.006	-3.346	1.748	-0.153
	-0.050	-0.027	-0.059	-0.037	-0.040	-3.327	-2.020	-0.125
- for management	0.304* *	-0.074		0.081	-0.002		4.103	-0.103
	-0.159	-0.110		-0.170	-0.183		-4.975	-0.217
Log likelihood	-2367.066	-1232.337	-136.109	-627.195	-976.553	-431.771	-1663.625	
Pseudo R2	0.067	0.072	0.376	0.165	0.165	0.161	0.070	
Wald chi2	306.260	177.150	101.300	209.910	307.040			
LR chi2						165.780	248.950	
R-squared								0.634
Observations	3,854	3,829	617	1,983	2,600	606	1,880	1,900

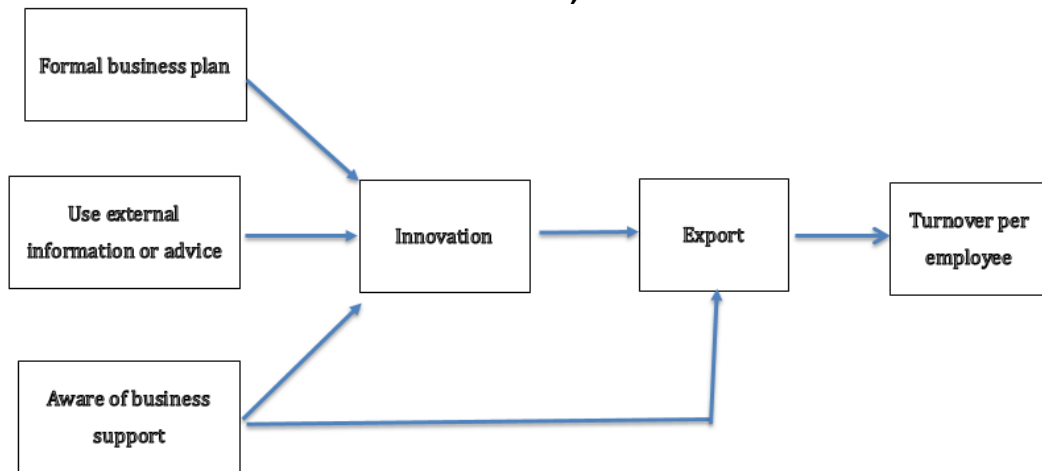
Notes: Other explanatory variables (coefficients not reported) are the same as in Table 2. Average marginal effects are reported in columns (1)-(8). Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; (2) All the explanatory variables are one year lagged except for the industry and location dummies.

Table 4: Semi-parametric Kernel matching: Average Treatment Effect for the Treated

		Treatment: Aware of business support		Treatment: Formal Business Plan		Treatment: Use external advice or information	
Whether or not has product/service/process innovation	ATT	0.038		0.118		0.127	
	Standard error	0.025		0.025		0.019	
	Confident interval	-0.012	0.087	0.068	0.169	0.090	0.164
Whether or not has new to the market innovation (products/services/processes)	ATT	0.029		0.041		0.061	
	Standard error	0.014		0.019		0.016	
	Confident interval	0.0003	0.058	0.004	0.078	0.029	0.093
Whether export goods	ATT	0.027		0.011		0.009	
	Standard error	0.012		0.015		0.012	
	Confident interval	0.003	0.051	-0.018	0.040	-0.015	0.033
Export sales from goods	ATT	1.721		0.875		-0.362	
	Standard error	0.468		0.552		0.587	
	Confident interval	0.793	2.649	-0.219	1.970	-1.526	0.803
Whether export services	ATT	0.032		0.015		0.020	
	Standard error	0.015		0.019		0.017	
	Confident interval	0.002	0.061	-0.023	0.053	-0.013	0.053
Export sales from services	ATT	0.980		-0.848		0.289	
	Standard error	0.740		0.833		0.664	
	Confident interval	-0.488	2.448	-2.501	0.804	-1.029	1.608
Whether export goods and/or services	ATT	0.052		0.024		0.032	
	Standard error	0.019		0.020		0.018	
	Confident interval	0.014	0.090	-0.015	0.063	-0.004	0.067
Turnover per employee in logarithm form	ATT	0.042		-0.012		0.103	
	Standard error	0.055		0.057		0.055	
	Confident interval	-0.067	0.152	-0.125	0.102	-0.006	0.212

Notes: Semi-parametric Kernel matching was used to estimate ATT. Bootstrapping standard errors and confident intervals are reported. **Bold** font indicates significant average treatment effect for the treated at 5% significance level.

Figure 1: Summary of the results (errors indicate significantly positive effects)



Appendix:

Table A1: Bias-corrected matching estimator – ATT estimates

		Treatment: Aware of business support		Treatment: Formal Business Plan		Treatment: Use external advice or information	
Whether or not has product/service/process innovation	ATT	0.040		0.116		0.139	
	Standard error	0.022		0.022		0.022	
	Confident interval	-0.003	0.082	0.073	0.159	0.095	0.183
Whether or not has new to the market innovation (products/services/processes)	ATT	0.032		0.055		0.064	
	Standard error	0.014		0.014		0.016	
	Confident interval	0.005	0.059	0.027	0.083	0.033	0.095
Whether export goods	ATT	0.120		0.016		0.069	
	Standard error	0.025		0.030		0.026	
	Confident interval	0.071	0.170	-0.043	0.075	0.018	0.121
Export sales from goods	ATT	5.014		0.685		0.522	
	Standard error	1.058		1.484		1.145	
	Confident interval	2.941	7.087	-2.225	3.594	-1.723	2.767
Whether export services	ATT	0.101		-0.008		0.011	
	Standard error	0.016		0.018		0.019	
	Confident interval	0.070	0.133	-0.043	0.027	-0.025	0.048
Export sales from services	ATT	3.511		-1.166		-0.277	
	Standard error	0.770		0.982		0.983	
	Confident interval	2.001	5.021	-3.091	0.758	-2.204	1.651
Whether export goods and/or services	ATT	0.122		0.008		0.038	
	Standard error	0.016		0.017		0.017	
	Confident interval	0.091	0.153	-0.026	0.041	0.004	0.071
Turnover per employee in logarithm form	ATT	0.018		0.006		0.090	
	Standard error	0.055		0.055		0.056	
	Confident interval	-0.090	0.126	-0.103	0.115	-0.019	0.199

Notes: Bias-corrected matching estimator (available in Stata –nnmatch- command) is used to estimate sample average treatment effect for the treated. Heteroscedasticity-consistent standard errors are reported using four matches in the second matching stage. **Bold** font indicates significant average treatment effect for the treated at 5% significance level.

Table A2: Balancing indicator analysis for the treatment effect models presented in Table 4

<i>a) Treatment: Awareness of business support</i>								
	Mean bias before	Mean bias after	Pseudo R2 before	Pseudo R2 after	p>chi2 before	p>chi2 after	Untreated on support	Treated on support
Whether or not has product/service/process innovation	8.900	1.600	0.053	0.002	0.000	1.000	958	1,564
Whether or not has new to the market innovation (products/services/processes)	8.900	1.700	0.053	0.002	0.000	1.000	955	1,554
Whether export goods	13.600	2.700	0.058	0.004	0.000	1.000	258	331
Export sales from goods	13.500	3.100	0.059	0.006	0.000	1.000	254	325
Whether export services	9.700	1.600	0.058	0.002	0.000	1.000	699	1,202
Export sales from services	9.700	1.900	0.058	0.003	0.000	1.000	670	1,133
Whether export goods and/or services	9.400	1.500	0.055	0.002	0.000	1.000	957	1,554
Turnover per employee in logarithm form	8.800	2.400	0.053	0.004	0.000	0.977	789	1,336

<i>b) Treatment: Use of Formal Business Plan</i>								
	Mean bias before	Mean bias after	Pseudo R2 before	Pseudo R2 after	p>chi2 before	p>chi2 after	Untreated on support	Treated on support
Whether or not has product/service/process innovation	14.300	1.500	0.127	0.002	0.000	1.000	1,542	977
Whether or not has new to the market innovation (products/services/processes)	14.300	1.500	0.128	0.002	0.000	1.000	1,538	969
Whether export goods	20.4	4.4	0.134	0.008	0.000	1.000	421	181
Export sales from goods	19.900	4.800	0.127	0.009	0.000	1.000	417	175
Whether export services	15.400	2.100	0.133	0.003	0.000	1.000	1,116	801
Export sales from services	15.800	2.400	0.139	0.005	0.000	1.000	1,063	753
Whether export goods and/or services	15.000	1.900	0.134	0.003	0.000	1.000	1,537	973
Turnover per employee in logarithm form	15.500	2.700	0.146	0.006	0.000	0.999	1,288	812

<i>c) Treatment: Use of external advice or information</i>								
	Mean bias before	Mean bias after	Pseudo R2 before	Pseudo R2 after	p>chi2 before	p>chi2 after	Untreated on support	Treated on support
Whether or not has product/service/process innovation	8.800	0.900	0.056	0.001	0.000	1.000	1,697	835
Whether or not has new to the market innovation (products/services/processes)	8.700	0.900	0.056	0.001	0.000	1.000	1,688	831
Whether export goods	14.000	3.400	0.096	0.007	0.000	1.000	411	191
Export sales from goods	13.200	3.500	0.091	0.008	0.000	1.000	407	186
Whether export services	10.600	1.100	0.076	0.001	0.000	1.000	1,282	640
Export sales from services	10.800	1.300	0.079	0.001	0.000	1.000	1,214	607
Whether export goods and/or services	9.800	1.400	0.075	0.002	0.000	1.000	1,693	839
Turnover per employee in logarithm form	10.000	2.100	0.082	0.004	0.000	1.000	1,404	719

Table A3: Correlation table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Has goods/services/process innovation (0/1)	1.00																
(2) Has new to the market innovation (products/services/processes)	0.46	1.00															
(3) Export goods (0/1)	0.00	0.11	1.00														
(4) Export services (0/1)	0.17	0.16	0.14	1.00													
(5) Export goods and/or services(0/1)	0.19	0.19	0.64	0.78	1.00												
(6) Export sales from goods	0.10	0.15	0.60	0.34	0.60	1.00											
(7) Export sales from services	0.10	0.14	0.23	0.63	0.63	0.66	1.00										
(8) Log turnover per employee	0.05	0.02	0.12	0.10	0.15	0.11	0.09	1.00									
(9) Capability for business plan/strategy (0/1)	0.06	0.07	-0.02	0.00	-0.01	-0.01	0.03	0.04	1.00								
(10) Capability for new products/services (0/1)	0.19	0.18	0.08	0.00	0.04	0.06	0.02	0.00	0.30	1.00							
(11) Capability to acquire finance (0/1)	-0.02	-0.05	-0.04	-0.08	-0.09	-0.05	-0.06	0.08	0.25	0.12	1.00						
(12) Capability for operational improvement (0/1)	0.07	0.06	-0.07	-0.01	-0.05	-0.04	-0.02	0.03	0.27	0.18	0.21	1.00					
(13) Use information or advice (0/1)	0.20	0.13	0.06	0.09	0.10	0.05	0.05	0.05	0.07	0.03	0.02	0.03	1.00				
(14) Aware of business support (0/1)	0.11	0.08	0.06	0.10	0.12	0.06	0.05	-0.01	0.10	0.04	0.05	0.03	0.13	1.00			
(15) Has a business plan (0/1)	0.16	0.12	0.03	0.04	0.04	0.04	0.02	0.03	0.23	0.11	0.07	0.14	0.16	0.15	1.00		
(16) Has multiple business sites (0/1)	0.05	0.05	0.01	0.05	0.03	0.01	0.03	0.05	0.03	0.04	0.01	0.04	0.05	0.00	0.07	1.00	
(17) Rural area (0/1)	-0.02	0.00	0.03	-0.03	-0.01	0.03	-0.04	0.08	0.00	0.00	0.06	0.01	0.03	0.00	-0.02	0.00	1.00
	0.09	0.94	0.00	0.00	0.44	0.03	0.00	0.00	0.96	0.85	0.00	0.68	0.00	0.91	0.04	0.82	

Centre Manager
Enterprise Research Centre
Warwick Business School
Coventry CV4 7AL
CentreManager@enterpriseresearch.ac.uk

Centre Manager
Enterprise Research Centre
Aston Business School
Birmingham, B4 7ET
CentreManager@enterpriseresearch.ac.uk