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SME innovation, exporting and growth – A review of existing evidence

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Abstract

SMEs which have a track record of innovation are more likely to export, more likely to export successfully, and more likely to generate growth from exporting than non-innovating firms. What are the factors that enable such performance? This paper summarises and synthesises the evidence on SME innovation, exporting and growth, paying particular attention to internal and external (eco-system) enablers, and for the interplay between innovation and exporting in SME growth. We highlight those areas for which the evidence base is secure and where the evidence base remains limited, and develop policy suggestions and an agenda for further research.

Keywords: Innovation, Exporting, SME, business growth

JEL codes: O31, O12

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1. Introduction

The increasing globalisation of markets and strengthening of global value chains both emphasise the importance of firms' export competitiveness. For SMEs, however, there is a strong positive relationship between exporting and growth and between exporting and innovation activity (Golovko and Valentini 2011). Indeed, the evidence considered in more detail later in this paper suggests that SMEs which have prior innovation are more likely to export, more likely to export successfully, and more likely to generate growth from exporting than non-innovating firms. European SMEs that export grow more than twice as fast as those that do not, while 'internationally active' SMEs are three times more likely to introduce products or services that are new to their sector than those which are entirely domestic in orientation (European Commission, 2010). Because exporters and innovative firms also tend to have higher productivity growth, the process of exporting and innovating which reinforces the growth of these firms also drives up productivity growth - the 'batting average' effect (BIS, 2011). There is therefore a potential rationale for policy interest in exporting and innovation at the firm level.

In this paper we summarize the current state of knowledge of the enablers of SME innovation and exporting. We also consider evidence on the interaction of SME innovation and exporting and the policy implications arising from this. The EU internationalisation survey referred to above suggests that, for the sample as a whole, approximately half of the 'internationally active' SMEs also innovated. Since around one quarter of the sample exported, this suggests that the vast majority of SMEs neither export nor innovate¹, and very few do both, a fact that should be borne in mind in the review of the evidence undertaken below.

Before reviewing the evidence on the enablers of SME innovation and exporting it is worth clarifying what we mean by 'innovation'². Our perspective here is deliberately broad,

¹ The biennial Small Business Survey carried out by BIS has information on both innovation and exporting activities for UK SMEs, but unfortunately provides no cross tabulation on these activities.

² An intuitive - and suitably broad - innovation definition is suggested by the US Advisory Committee on Measuring Innovation which defines innovation as: 'The design, invention, development and/or implementation

embracing both the technological and non-technological dimensions of firms' innovative activity as well as the potential for both radical and incremental change³. The term 'exporting' we use here in its normal sense of outward international trade in goods and/or services, conducted either directly or through a third party (such as a sales agent). Apart from being important in its own right, exporting is often the initial stage in the internationalization process for SMEs (Jones, 2001).

We divide our discussion of the evidence base on the enablers of SME innovation and exports into three main sections. Section 2 focuses on the internal enablers, i.e. those capabilities of individual SMEs which have been linked most strongly to innovation and export success. Section 3 focuses on the external enablers, those elements of firms' operating environment which may either enable or hinder innovation and export performance. The importance of such external influences has been emphasised in recent discussion of open innovation and global value chains. Section 4 focuses on the rather complex and dynamic links between innovation, exporting and business growth. Section 5 considers some policy implications and areas for further research.

2. Internal enablers of innovation and exporting

The contribution of SMEs to innovation and technological development is often emphasised, with examples such as Silicon Valley often cited as hotbeds of small business innovation (Audretsch, 2002; Bresnahan and Gambardella, 2004). The strengths and weaknesses of SMEs in terms of innovation and exporting have also been widely discussed: typically smaller firms are said to have advantages in terms of quick decision making, willingness to take risk and flexibility in responding to new market opportunities; while larger firms have advantages linked to scale and the availability of specialist resources. This suggests that 'the relative strengths of large business are predominantly material (economies of scale and scope, financial and technological resources etc.), while those of small firms are mostly behavioral

of new or altered products, services, processes, systems, organisational structures or business models for the purpose of creating new value for customers and financial returns for the firm'.

³ Limitations of space mean that we pay relatively little attention here to the potentially contrasting performance impacts of radical and incremental innovation. For an example of an excellent recent analysis on this theme see Buddelmeyer et al. (2010).

(entrepreneurial dynamism, flexibility, efficiency, proximity to the market, motivation)’ (Vossen 1998, p. 90).

In this section we review the evidence on the internal enablers of SME innovation and exporting – skills, finance, R&D etc. A key theme which emerges is the resource-constrained nature of many small firms and therefore their dependence on the broader eco-system in which they are located. The availability and accessibility of these external resources is the focus of Section 3.

2.1 Skills, leadership and people management

The research literature provides considerable evidence of the direct contribution of workforce, managerial and marketing skills to innovation and exporting, although the literature on SMEs specifically is relatively limited (Leiponen 2005; Freel 2005; Knight and Kim 2009; Brambilla, Lederman, and Porto 2012). In the research literatures on national competitiveness there is also broad agreement that firms require distinctly different skill sets to pursue different market strategies. Different skill needs are also evident for firms adopting different exporting strategies, with one recent study finding that firms exporting to more competitive, high-income countries had more skilled workers (Brambilla, Lederman, and Porto 2012). The skills needed for innovation and exporting also differ at different stages of the value chain. For example, technical staff or creative staff may play a key role in the early, developmental, stages of an innovation project but marketing staff are likely to be more important in terms of commercialisation (Herrmann and Peine 2011). There is also evidence that the set of managerial skills needed for entering export markets is different from that required for succeeding in export markets. Commercial and managerial experience help firms become exporters, but once over the exporting hurdle it is the level of managerial education, rather than experience, that has a substantially positive effect (Ganotakis and Love 2012).

Varying skill needs are also reflected in the need for ‘ambidextrous leadership’ which moves from transformational leadership towards more focussed transactional leadership as innovation projects move closer to market (Rosing, Frese, and Bausch 2011). Business leaders also have a crucial role in ensuring effective employee engagement in innovation and exporting. There is suggestive evidence that effective people management and team development and management can play a significant part in ensuring the success of both

innovation and exporting projects and so contribute positively to SMEs' success (McCloud and Clarke, 2009).

Globalising markets and increasingly open models of innovation therefore pose significant skills and people management challenges for smaller firms. This in turn emphasises the importance for SME innovation of the national 'skills ecosystem' and related legal, vocational education and industrial relations systems (Cooney 2010). Partnering or collaborative working for innovation or exporting, however, also offers SMEs potential route for accessing external skills and so overcoming internal skill constraints (Jones and Craven 2001). Maintaining and developing collaborative relationships also has significant skills and people management implications, however, and one recent study of technology transfer centres in Italy identifies the importance of the combination of technical skills and networking competences as well as relevant relational capital (Comacchio, Bonesso, and Pizzi 2012).

2.2 Research and development

In-house research and development (R&D) plays a crucial role in firms' ability to generate new knowledge which may provide the basis for proprietary intellectual property and innovation. In broadly based studies of the determinants of innovation, firms' R&D capability is almost always strongly and positively linked to innovation outputs, a relationship which is stronger in research-intensive industries (Crepon et al. 1998; Love et al. 2009; Roper et al. 2008). Even in low-tech manufacturing and service sectors, where R&D might be thought to be less important, the evidence suggests positive R&D-innovation relationships. Two main mechanisms are thought to be important in this relationship: first, R&D may create new knowledge which provides the basis for innovation; second, skilled R&D staff may increase firms' absorptive capacity, i.e. their ability to assess, access and absorb external knowledge (Griffith et al. 2003).

In larger firms, R&D may be formally organised in an R&D department or unit. In the majority of smaller firms, reflecting the nature of innovation activity itself, R&D activity where it takes place is more often informal, ad hoc and opportunistic. R&D in SMEs is also less likely to be a specialist function than in larger firms, with development work often being

undertaken by skilled employees or senior management. One implication – strongly supported by the empirical evidence – is that innovation in smaller firms is less dependent on internal R&D than that in larger firms and more dependent on external knowledge obtained either through partnerships or spillovers (Piergiovanni et al. 1997; Ganotakis and Love, 2011).

Evidence on the direct relationship between R&D and exporting is less clear, and ‘a number of studies have found an insignificant relationship between R&D investment and export intensity. This leads to the suggestion that what really matters for exporting is innovation (both product and process) rather than R&D, because the ability to compete in international markets is ultimately influenced by the firm’s capacity to compete internationally, rather than its investment in research activity. This may be especially true for SMEs, where formal R&D measures markedly under-report their research activity and degree of innovativeness’ (Ganotakis and Love, 2011, p. 283). Nevertheless, other work on UK firms does suggest that R&D, innovation and exporting are mutually reinforcing (Harris and Moffatt, 2011).

2.3 Capital investment and equipment

Recent macro-economic evidence suggests a positive link between nations’ fixed capital investment and export market performance (Seo et al. 2012). At the level of the individual enterprise notions of embodied technical change, through which firms update their technologies through fixed capital investment have a long history. Indeed, such purchases may be another way in which innovative SMEs overcome internal resource limitations. One study of young Italian innovative SMEs, for example, found that purchases of machinery and equipment were the ‘crucial’ driver of innovative outputs (Pellegrino et al. 2009). Acquiring such capital does, of course, depend on the accessibility of investment finance which may be a particular issue for young innovative SMEs, particularly where these firms are also seeking to export. In Canada, for example, there is some evidence that SMEs which were growth oriented and which were seeking to export had a particularly high turndown rate when seeking external finance, perhaps due to perceived risk (Riding et al. 2012).

2.4 Internal financing

Small firms often face particular problems in accessing external finance for innovation and export development as the standard issues of viability and legitimacy associated with smaller firms are exacerbated by the commercial and technical risk associated with their innovation and/or export project. In the early stages of development – exploration of market potential, product or service development – this mix of uncertainty and risk may make it particularly difficult for firms to present a robust case to potential finance providers, leading to significant turn-down rates (Riding et al. 2012). Developing a robust business case may become more feasible, however, once the initial risks are overcome and the focus moves to the establishment of firms' operations, market introduction etc. Even here, however, commercial risks are likely to be significant, particularly in situations where a firm's export operations or innovation is unprotected either by strategic or legal frameworks. This is likely to place increased emphasis on the internal financing of such projects.

A number of studies have considered the role of internal financing on expenditure on R&D, generally identifying positive relationships between cash-flow, liquidity and R&D investment. Studies for smaller firms also suggest that internal funding was more important for innovation in smaller firms than for larger companies – perhaps reflecting stronger external market constraints on smaller firms (Ughetto, 2008). Essentially similar findings are evident for exporting: financial constraints can act as a barrier to smaller firms engaging in exporting (Bellone et al. 2010). Where there is evidence of market failure, this suggests the potential value of public intervention to help potential SME exporters and innovators overcome initial (sunk) entry/R&D costs and expand their range of products, services and markets.

2.5 Design

The importance of design as a contributor to innovation success has been emphasised due to the increasing 'design intensity' of a wide range of products (Gemser and Leenders, 2001), and the ability of designers to enhance products' functional, emotional and symbolic value (Verganti, 2009). Design-driven or design-led new product development processes may also contribute to the development of more radical innovations. Evidence from innovation surveys also suggests a positive linkage between design investment and innovation outputs in a range of contexts (Cereda et al. 2005; Czarnitzki and Thorwarth, 2011; Love et al. 2011). Less

comprehensive evidence exists on the links between design and export outcomes. There is, however, some evidence that export results are stronger where firms orient their product design explicitly towards the needs of international customers (MacPherson, 2000). Indicative evidence also suggests that in supplier dominated industries investments in design and productive efficiency may have a stronger influence on export success than investments in internal R&D or external knowledge gathering (Flor and Oltra, 2005).

It has been suggested that SMEs may face particular behavioural, cultural and resource issues which may reduce their ability or willingness to engage with design as part of their innovation activity (Berends et al. 2011). SMEs may, for example, fail to understand the potential value of design for innovation success (Milward and Lewis, 2005). Alternatively, communication difficulties may mean that SMEs find it difficult to relate to designers and establish common objectives and aspirations (Goffin and Micheli, 2010). Smaller firms may also be less likely to have internal design resources than larger firms and may therefore be more dependent on external design providers (Berends et al. 2011). Again this emphasises the potential importance of SMEs operating environment for innovation, the availability of external design resources and the potential value of support measures which help SMEs to embed design practices (Design Council, 2012).

2.6 Intellectual property management

The role of patents, protected designs and copyright in innovation and exporting have been much discussed and it is often suggested that SMEs may be disadvantaged in intellectual property (IP) regimes due to the costs of IP registration and protection (Blackburn, 2003). It has also been suggested that as individual SMEs typically have fewer patents etc. they may be less able to adopt a technology swapping mechanism to defend their IP rights than larger companies which may have a wider patent portfolio (Lanjouw and Schankerman, 2003). There is some evidence that larger patent holdings may also be more conducive to open innovation (Lichtenthaler, 2010). Levels of IP activity among SMEs also vary strongly between regions and sectors (Rogers et al. 2007), however, there is little consistent evidence of any clear association between IP activity and either SME growth or survival (Rogers et al. 2007). The authors of one UK study conclude:

‘These findings support the view that SMEs see value in registering their innovations to acquire IP protection ... the view that SMEs may be so financially disadvantaged,

or lacking in information about IP assets, that they do not widely use these systems of protection is rejected by this study' (Rogers et al. 2007, p. 41).

SMEs' IP protection strategies do, however, differ from those of larger firms focussing more often on speed to market or secrecy rather than patenting. One exception appears to be firms working with universities – typically R&D intensive or science-based small firms for which patents remain an important mechanism for appropriating the returns from innovation (Leiponen and Byma, 2009). For these firms patents also provide an important signalling mechanism, attracting customers and enticing venture capital investments (Holgersson, 2013).

2.7 Leadership and strategy

While there has been considerable discussion about innovation strategy in the research literature the current state of knowledge is characterised by 'conflicting theoretical predictions, persisting knowledge gaps and theoretical inconsistencies' (Keupp et al. 2012). Relatively few studies also focus specifically on innovation strategy in SMEs suggesting few areas of agreement in terms of the 'best' innovation strategies. For example, while there is much discussion of 'born global' firms⁴, there is evidence that for many SMEs exporting is an opportunistic and sporadic activity, rather than a strategic priority (Welch and Welch, 2009; Crick, 2003; Bonaccorsi, 1992; Love and Ganotakis, 2013). One area of strategy in which there is growing consensus, however, is the choice between 'closed' and 'open' innovation and the extent of SMEs' external knowledge search. Here, the evidence points strongly towards the superiority of open models of innovation – particularly for SMEs – and in particular to innovation partnering along firms' supply-chains. Such partnerships may help both to increase levels of innovation in the short-term but also to help SMEs sustain their innovation success (Clausen et al, 2012). The evidence also suggests that co-operative strategies may also help SMEs to enhance their knowledge about export markets and improve export performance (Haahti et al, 2005). Other strategic factors linked to export success among SMEs have been: an explicit exporting strategy, systematic planning and organising for exporting and strength in marketing and product/service quality (Wheeler et al. 2008).

⁴ These are firms which internationalise early in their lifecycle, and tend to be heavily involved in international activities virtually from formation. Although not numerous, born globals may be important: evidence for the UK suggests that while they account for only around 2% of firms in the marketable goods and services sector, they are much more likely to innovate and perform R&D than non-exporters, and tend to be more productive than non-exporters. They also tend to be concentrated in high technology sectors (BIS, 2010, pp. 21-22).

One recent study – based on Spanish data – captures a number of these factors and examines the complementarity between innovation and exporting as drivers of SME growth. Their evidence provides strong support for the reinforcing impacts of innovation and exporting on SME growth and the potential for a ‘virtuous circle’ in which innovation drives exports, and the external knowledge gained from export markets drives further innovation and growth (Golovko and Valentini, 2011).

A number of studies also suggest the importance of leadership in shaping firms’ innovation outcomes, and emphasise differences between the appropriate leadership styles for innovation in larger and smaller firms. In larger firms, there is positive evidence of the relationship between transformational leadership and organisational innovation (Garcia-Morales et al. 2012), however, such effects appear strongly moderated by organisational size. This suggests that innovation in smaller firms may benefit more from transactional leadership styles as SME leaders are able to monitor and reward employees more effectively (Vaccaro et al. 2012). In terms of exporting the evidence also emphasises the role of management and leadership in success reflecting: (a) favourable and supportive attitudes (including perceptions, motivations, and commitment) to exporting; and, (b) the quality of managerial resources, including management education/background (Wheeler et al. 2008).

2.9 Internal enablers – summary

Considerable progress has been made over the last decade in our understanding of the internal enablers of innovation and exporting, although the evidence base for SMEs remains limited in some areas. There are perhaps four main areas in which there is broadly based and consistent evidence. First, in terms of skills it is clear that high quality skills really matter for innovation and exporting, although different innovation/export strategies require very different skill sets. The importance of technical skills is also increasingly matched by the value of networking and team-working skills. Second, there is strong and consistent evidence of the positive relationship between R&D and innovation across all firm size bands and industries. This undoubtedly reflects both the knowledge creation and absorptive capacity effects of R&D. Thirdly, although there are relatively few studies, there emerges a consistent and positive linkage between firms’ capital investments and innovation and export success. Finally, a similarly positive relationship exists between innovation and export activity and strong cash-flow and liquidity.

In a number of other areas the evidence base – particularly for SMEs – remains either inconsistent or limited. In terms of the internal enablers of innovation and exporting there are, at least, four areas in which the evidence remains limited. First, while the relationship between different skills indicators and firm level performance outcomes is well understood, the role of people management and employee engagement is much less well evidenced, particularly in SMEs. Second, while there is strong suggestive evidence of the value of design for innovation and exporting in general there has been little rigorous analysis for SMEs. Very much the same could be said for the relationship between R&D and exporting in SMEs. Third, the evidence both on the extent of IP management and its performance benefits remains limited. Fourth, relatively little is known about the relationship between business strategy and planning and innovation and exporting success in SMEs.

3. External enablers of innovation and exporting

Earlier sections of this paper have emphasised the significant extent to which the innovation and exporting activities of SMEs depend on external resources. This reflects changes in the nature of the processes under-pinning innovation as firms seek to adopt leaner, more rapid and more effective innovation strategies. This has led to consideration of open, partnered or networked innovation where knowledge resources are pooled and innovation risks can be shared.

For SMEs open innovation provides a way of overcoming internal resource constraints which may limit the scope of their innovation activities. Open innovation may also help smaller firms share innovation risk and match innovation resources flexibly to match opportunistic or intermittent episodes of innovation activity. The potentials for open innovation in SMEs are greatest however, where SMEs are operating in ‘strong’ industrial and innovation eco-systems where potential innovation partners are plentiful and easily accessible (Toedtling et al. 2011). In the research literature this is reflected in discussions of regional innovation systems, innovative milieu and notions such as the triple helix (Braczyk et al. 1998; Shefer and Frenkel, 1998; Leydesdorff and Etkowitz, 1998).

In this section we briefly review the evidence on the key external enablers of SME innovation and exporting. Two main categories of external enablers are considered: external factors or linkages which may enhance or augment the knowledge base of the SME and provide the

basis for innovative or export development; and, resource enhancing or augmenting factors which may help SMEs to overcome internal resource constraints. This is followed by a brief review of demand-side drivers of SME innovation and exporting.

3.1 Knowledge enhancing or augmenting factors

Spatially specific drivers of innovation and exporting have been much discussed in the research literature in terms of industrial districts, industry clusters, innovative milieu and innovation systems. More generally, recent literature distinguishes between interactive and non-interactive forms of learning, the former characterised by firms building strategic relationships with other firms and external knowledge creators, while the latter is characterised by a lack of reciprocal knowledge and/or resource transfer (Glückler 2013). In the case of SMEs we can distinguish (at least) three key channels through which firms may obtain external knowledge which can contribute to their innovation and exporting activity:

- ‘Being there’ in which firms benefit from un-priced, and perhaps unanticipated, flows of local knowledge or information mediated through social contacts or labour market linkages. Such effects – agglomeration economies - are likely to be more significant the ‘stronger’ and better connected the local industrial eco-system and may be reinforced by local competition and selection effects (Coombes et al. 2009).
- ‘Openness’ - partnering in which firms engage in deliberate relationships with other organisations in order to gather either technical knowledge or market understanding. Such relationships may vary widely in nature, be formal or informal, collaborative or contractual.
- ‘Learning by exporting’ in which firms gain market – and also potentially innovation-related – knowledge through their exporting activities. Such learning is more likely to be more influential where exports go to knowledge-intensive or to highly competitive markets

Knowledge gains from ‘being there’ reflect the character of knowledge as a semi-public good with properties of non-rivalry (He and Wong 2012). For SMEs, alternative locations therefore offer different ranges of local knowledge. Evidence from Australia, for example, suggests that more urban locations may allow SMEs easier access to export related infrastructure and networks and so contribute positively to export outcomes (Freeman, Styles, and Lawley

2012), while another study concluded that export performance ‘is strongly influenced by background variables from the local business environment’ (Stöttinger and Holzmüller 2001, p. 23). Knowledge gains from ‘being there’ may be augmented by SMEs’ purposive development of linkages to outside sources of knowledge (Chesborough 2003). Indeed, recent empirical evidence suggests the prevalence of open innovation among SMEs has increased in recent years (van de Vrande et al. 2009).

An SME’s degree of openness is not the only influence on innovation performance: the nature of that openness may also matter. For example, a recent study of c.1500 European SMEs finds that customers are often an attractive source of innovation inputs (Brunswicker, and Vanhaverbeke. 2011). Some types of innovation linkages - for example, with universities and research centres – may, however, require greater expertise and absorptive capacity from the firm: small firms are more likely to lack these resources. Linkages with universities and researchers are also fraught with risks due to the uncertainty of any commercial applicability of research outcomes and larger firms may be better equipped for leveraging these risks. Again, evidence is limited here, but does suggest that supply-chain linkages (i.e. with customers and suppliers) are not only the most common forms of innovation linkage for small firms, but also have the largest positive effect on innovation performance (Vahter et al. 2012).

Evidence also suggests the value of diversity in terms of firms’ portfolio of external alliances, and that small firms benefit more from openness than larger firms (Vahter et al. 2012). The evidence also points to strong sectoral and regional contrasts (Laursen and Salter 2006; Cui and O’Connor 2012; Iammarino et al. 2012). For example, there is some evidence that the benefits of openness may be weaker in services where some firms may not have developed the managerial routines to take advantage of external knowledge sources (Leiponen 2012).

Purposive links may also help SMEs to overcome the information and set-up costs they face in entering foreign markets. This may be particularly important for SMEs which have limited internal knowledge and financial resources. Evidence suggests that exporters tend to be substantially better networked externally than non-exporters. Importantly too, external collaboration is positively associated with exporting, but the nature of this effect differs with firm size; specifically, for large and medium-sized firms it is the existence of joint business operations that boosts exports, while for small firms it is business and trade association

membership that matters, perhaps suggesting that information on foreign markets is a key issue for small enterprises (Tomiura, 2007). Studies from other countries find similar results. For example, a study of South African manufacturing SMEs (Gumede, 2004) finds that greater access to information on export markets both encourages exports and is associated with increased export intensity, while having external business linkages encourages exporting. Another multi-country, firm-level study finds that foreign networks (financial, ownership and joint-venture) and having strong linkages with domestic chambers of commerce are both positively linked to being an exporter (Ricci and Trionfetti, 2012).

There is, however, little agreement on exactly which type of commercial linkages are most likely to produce knowledge that is useful to export performance, with some studies suggesting that supply-chain linkages (especially with suppliers) are most associated with improved export performance (Ibrahim and Ogunyemi, 2012), while others suggest that non-supply-chain linkages are associated with an increased likelihood of exporting (Ganotakis and Love 2011).

3.2 Resource enhancing or augmenting factors

Collaborative arrangements such as those discussed earlier may play an important role in releasing the resource constraints faced by smaller firms. Globally, however, governments have responded to the resource issue of smaller firms by providing targeted support for individual SMEs' innovation projects often in the form of public sector grants or loans. There is considerable evidence of the positive additionality of public grant support for private R&D activity and subsequent positive effects on business (Griliches 1995; Mamuneas and Nadiri 1996; Hewitt-Dundas and Roper 2009). This effect can operate through a number of different organisational mechanisms, however, including: reducing the cost and risk of R&D to firms; contributing to developments in firms' human resources; improving absorptive capacity; generating reputational or 'halo' effects; and, creating cost savings through collaborative R&D and the sharing of research results area (Trajtenberg 2000; Freel 2005; Veugelers and Cassiman 1999). It is worth noting, however, the historical bias in support for innovation towards technological or technical innovation. Non-technological innovation – important in both manufacturing and services – has been only weakly supported in the past although there

are some international examples of effective policy in this area (Trajtenberg 2000; Freel 2005; Veugelers and Cassiman 1999)⁵.

Specifically with regard to SMEs in the UK, there is some evidence that public support for innovation is both effective and efficient. A recent study using a large sample of c10,000 SMEs and employing propensity score matching as a counterfactual found that SMEs with public support for innovation were significantly more likely to innovate, and that innovators grew faster than non-innovators (Foreman-Peck, 2012). The same study also finds that SME tax credits were relatively expensive compared with earlier support instruments (e.g. SMART and SPUR).

In terms of exports, public support typically aims to help firms overcome information asymmetries or the costs of entering export markets. Here, one of the key roles for government can be in acting as a ‘trusted intermediary, bridging gaps in private-sector networks in ways that could not be done as effectively, if at all, by a commercial service provider’ (BIS, 2010, p. 86). Evidence for the UK suggests that export services provide by UK Trade and Investment (UKTI) do have a positive effect on overcoming these barriers. Specifically, three principal benefits of UKTI support have been supported by evaluation evidence. First it has substantial positive impact on the profit and medium-term performance of supported firms, linked to stronger business growth. Second – and linking back to the connection between exporting and innovation – public support has a substantial positive impact on business R&D and innovation, suggesting lasting positive effects on business competitiveness in both domestic and overseas markets (Driffield et al. 2010). Third, public support can have a direct and substantial positive impact on business skills and export know how (BIS, 2011), helping to relieve the internal resource constraints experienced by SMEs. It should be noted that these evaluations of UKTI support are based on (largely) econometric studies carried out on behalf of UKTI rather than on papers in peer-reviewed academic journals.

3.3 Demand-side effects on innovation and exporting

The external knowledge-enhancing and resource-enhancing effects considered above operate primarily through the supply-side. The demand-side – whether from consumers, intermediate

⁵ See: <http://akseli.tekes.fi/opencms/opencms/OhjelmaPortaali/ohjelmat/Serve/en/etusivu.html>.

demand from other companies or the public sector – also plays an important role in shaping innovation and export performance (Mowery and Rosenberg, 1979). Two elements of the demand for innovations in any market have been emphasised: the speed at which firms, consumers and the public sector adopt new innovations; and, the lead role of customers in articulating a demand for innovations (Allman et al. 2009). The demand-side influences on export growth have also been widely discussed with an emphasis on market growth, average incomes in importing countries, logistics and exchange rate stability (Eckaus, 2008).

3.4 External enablers – summary

As with the internal drivers of innovation and exports significant progress has been made in recent years in our understanding of the external drivers of innovation and exporting. Strategic debates about open innovation and partnering have focussed attention on firms' innovation and knowledge gathering strategies while more policy-oriented discussions have explored the potential impact of changes in framework conditions and business eco-systems. All told, the evidence suggests that external factors can have a significant effect on the innovative and export success of SMEs. The scale and size of these effects depends crucially, however, on SMEs' ambition and capability to take advantage of the available external resources.

There are perhaps five main areas in which the evidence is consistent. First, purposive links formed between SMEs and their development partners – openness – can play a positive role in innovation and export growth. Second, such links are likely to be more positive in 'stronger' eco-systems and where SMEs have greater absorptive capacity. Third, there is considerable evidence that targeted public support for innovation and exporting can yield significant additionality. Fourth, demand-side factors can provide an important stimulus to both innovation and exporting, although some studies have raised questions about the scale and sophistication of demand for innovative products from UK firms, consumers and government. Finally, the evidence emphasises the positive role of consumer or user-led innovation, and the potential catalytic role of public procurement, in stimulating SME development.

These 'knowns' are balanced by a series of less well understood elements of the external drivers of innovation and exporting. First, while it is clear that 'place' matters for both innovation and exporting relatively little is known about the mechanisms through which the

gains from ‘being there’ operate particularly for SMEs. Second, it remains unclear which eco-system characteristics are more important in influencing SMEs’ innovation and export success. In part, both of these issues relate to a problem of measurement, and the difficulties associated with characterising the ‘strength’ of the eco-systems within which firms are operating. Third, it is unclear which types of purposive linkages have the greatest benefits for SMEs, particularly in terms of supporting export development. Fourth, there is some uncertainty about the importance of learning by exporting for SMEs, particularly where exporting is an irregular rather than sustained activity.

4. Innovation, exporting and SME performance

This section summarises the key points of an enormous literature, highlighting those econometric studies which are most relevant with regard to SMEs, and in which the evidence seems strongest. It does not aim to be a comprehensive summary of the literature on innovation, exporting and performance: more detailed and general literature reviews are highlighted in the text where appropriate.

4.1 Innovation and performance

Innovation has long been recognized as a key element of competition and dynamic efficiency of markets. Innovators (product, process and organizational) should take market share from non-innovators and grow at their expense, until such time as their market position is undermined first by imitations of new products and processes, and ultimately by yet newer products. In the long run, therefore, innovators will grow faster, be more efficient, and ultimately be more profitable than non-innovators.

There is a wealth of evidence indicating a positive relationship between innovation and firm performance in both manufacturing and services. Many of these studies use some form of ‘production function’ approach relating innovation (inputs or outputs) to some aspect of performance, generally productivity (Roper, Du, and Love 2008). Some studies find clear evidence of a positive relationship between both product and process innovation and productivity (Hall et al. 2009), while others find a positive association between innovation and growth (in employment and/or sales) (Freel 2004; Ganotakis and Love 2012; Oke, Burke, and Myers 2007).

Evidence specifically for SMEs is more patchy, and often characterized by small sample sizes and by relatively simplistic econometric analysis. For example, SME analyses typically fail to address issues such as the simultaneous relationship between innovation and performance or issues of self-selection (e.g. better performing firms choose to innovate, rather than innovation improving performance). The failure of much of the SME literature to allow for the interdependence of innovation and firm performance is likely to be significant. A study of Italian firms strongly suggests a two-way relationship: innovative firms outperform non-innovators, but better performing firms are also more likely to innovate, and to devote more of their resources to innovation (Cainelli, Evangelista, and Savona 2006).

4.2 Exporting and performance

There are good reasons to expect exporters to be more productive than non-exporters. This may arise because highly productive firms are more likely to become exporters (i.e. self-selection), and/or because exporting makes firms more productive. These two scenarios are not mutually exclusive, but from a public policy perspective it is important to know whether either or both hold in practice.

Recent economics research on exporting starts from the recognition that there are fixed costs involved in entering export markets, and therefore market entry is easier for more productive firms (Helpman et al. 2004). The rationale is that firms contemplating entry to foreign markets have to engage in market research, set up new distribution networks, negotiate with potential new partners, and may have to modify their product range, all of which incur costs. Only those with sufficiently low marginal costs have the profits large enough to cover these fixed costs of entry. Thus exporters are more productive than non-exporters not specifically because of benefits derived from exporting, but because they are more productive firms to begin with, and can therefore overcome the fixed costs of entering foreign markets. This is the self-selection hypothesis, which is strongly supported by the empirical evidence (Wagner, 2007).

The second possibility is that firms' productivity improves as a result of their exporting activity. The channels for this are threefold. First, the stronger competition in foreign markets forces firms to improve both products and processes and thus remain competitive. Second, there is the possibility of 'learning by exporting', principally involving being exposed to superior foreign knowledge and technology which also helps to boost the

productivity of exporting firms. Finally, scale effect may be important. Exporting extends the market over which margins may be earned, and since many costs, such as R&D, are largely fixed, such investments may be recouped over a larger sales volume.

Evidence for all firms on the productivity benefits from exporting is somewhat mixed, with some studies finding evidence that entry into exporting results in productivity benefits, while others fail to find any effects (Ganotakis and Love, 2011). Interestingly, recent evidence from the Taiwanese electronics industry, suggests that exporting significantly boosts productivity, especially if accompanied by investment in R&D and/or labour training (Aw et al. 2007).

Evidence specifically on SMEs is again rather patchy, and uses a number of measures of performance. A study of 164 Japanese SMEs (i.e. less than 500 employees) finds a positive association between exporting and (lagged) sales and asset growth, but a U-shaped relationship between exporting and productivity (Beamish and Lu, 2006). Perhaps the most sophisticated research is on 14,000 manufacturing SMEs from Sweden over the period 1997 to 2006 (Eliasson, Hansson, and Lindvert 2012). Using propensity score matching, this study finds evidence that: i) small firms self-select into export markets on the basis of productivity; ii) export-entrants increase productivity relative to other firms shortly before entry, possibly via higher investment in physical capital; and, iii) the productivity gap between export-entrants and non-exporters does not continue to grow after market entry. In other words, small firms learn *to* export, but do not exhibit learning *by* exporting. However, evidence from Spanish SMEs suggests there may be another benefit arising from exporting; survival-by-exporting (Esteve-Perez et al. 2008). Specifically, exporting SMEs have a significantly lower likelihood of failure than non-exporters. This effect remains significant even after controlling for variables capturing some of the benefits commonly attributed to learning-by-exporting, such as firm productivity and innovative outcomes.

4.3 Innovation and exporting

Traditionally, economic approaches to export performance have viewed firms' competitive advantage as being based on factor endowments or the quality of firms' products or services. In both of these approaches the implied (positive) link runs from R&D/innovation to exporting. By contrast, endogenous growth models recognise the possibility of the effect running from exporting to innovation (Grossman and Helpman, 1991). The channels for this

are similar to those summarised in the last section: competition from foreign sources, learning-by-exporting, and scale effects.

There is an enormous empirical literature suggesting a positive link between innovation and exporting, and a rather smaller literature suggesting the reverse effect (i.e. exporting fosters innovation) (Ganotakis and Love, 2011; Harris and Li 2009 and 2010). In terms of SMEs, a survey of 9,480 SMEs in 33 European countries in 2009 found a strong positive association between ‘internationalisation’ (including exporting) and innovation, but did not analyse the nature of this relationship (European Commission, 2010). Possibly the most relevant research is on 1400 Spanish SMEs over a 10-year period, which specifically seeks to assess whether innovation and exporting are complementary for sales growth (Golovka and Valentini, 2011). This study suggests that complementarity does indeed exist – indeed, only SMEs that both innovate and export generate significantly greater sales growth than firms that do neither: simply doing either exporting or innovation is not enough. Research from the same Spanish dataset concludes that the strong positive association between exporting and productivity is largely moderated through (product) innovation; in other words, once previous innovation performance is allowed for, the positive association between exporting and productivity is weakened, but is still present (Cassiman et al. 2010). A similar conclusion regarding the complementarity of exporting and innovation arises from a study of service-sector firms in Northern Ireland (Love, Hewitt-Dundas, and Roper 2010).

4.4 Innovation, exporting and performance – summary

There is a very substantial body of economic evidence on the links between innovation, exporting and performance at the firm level. Specifically, there is general agreement on three key findings. First, there is a strong positive association between innovation, exporting and performance in terms of productivity and/or growth. This is consistent across countries and time periods. Second, innovation and exporting appear to work jointly to improve performance. Innovation without access to foreign markets does not seem to provide substantial performance benefits. Third, there is also a substantial element of interdependence and self-selection in this process. Productive, well-run firms tend to both innovate and export, but even when the self-selection is allowed for, there are performance benefits from innovation and exporting.

There are, nevertheless, important areas in which our knowledge is incomplete. Perhaps most importantly, evidence on SMEs is fairly patchy – specifically, the extent to which the innovation-exporting-performance relationship involves self-selection is unclear for SMEs. SMEs tend to innovate and export less than other firms, but it is unclear whether the mutually reinforcing relationship between them is stronger or weaker for SMEs than larger firms. The principal reason for this appears to be the lack of extensive panel datasets for SME performance. By contrast, much SME research still relies on cross-sectional data, which may provide detailed information on firm characteristics, but which limits the ability to draw conclusions on causality. The work of Eliasson et al (2012) reviewed above is an important exception to this.

In addition, information on different types of innovation and their effects is limited; specifically we know relatively little about the effects of organizational innovation, for example. And, given that some SMEs are intermittent exporters, more information is required on whether persistence in exporting has performance implications for smaller firms, as well as the differential performance implications of ‘born globals’. Finally, there is the issue of what the key performance measure resulting from innovation and exporting ought to be. Following the theoretical literature productivity is the key issue in most econometric studies, but (sales) growth may also be important in the SME context.

5. Conclusions: Research agenda and policy implications

Based on the evidence reviewed earlier a summary of the main areas of agreement and contention in terms of SME innovation and exporting is provided in Table 1. This also forms the basis for some generalised policy recommendations where the evidence is clear, and a potential research agenda for those areas in which there is limited or contentious evidence.

Evidence on the internal drivers of innovation and exporting reinforces the importance of a number of policy agendas around skills upgrading and support for firms’ investment in R&D, design and capital equipment. In terms of skills, for example, evidence of the value of high level skills for SME innovation and exporting emphasises the importance of measures such as the supporting the development of tailored apprenticeship programmes which can help with firms’ specific innovation and export strategy. Similarly, measures in the UK such as the

Innovation Vouchers, Smart Awards and Knowledge Transfer Partnerships, and the Design Leadership Programme have proven effective in supporting SME innovation.

Measures to promote access to finance also have an important part to play by increasing SMEs liquidity and cash flow leaving more scope for investment in innovation and export development. Such measures are likely to be most valuable, however, when improved access to finance is accompanied by specialist advice or mentoring related to innovation or export development. Measures such as the Growth Accelerator in the UK adopt this approach combining mentoring with support for management and leadership development, and may prove effective. Strong evidence also exists on the value of skills development and R&D for SME innovation and exporting. There is more limited evidence for SMEs – and therefore a less robust evidence base on which to base policy – for some aspects of intangible investment (such as design and IP management), and some aspects of people management and engagement, and more empirical work would be welcome here. Further research is also needed to clarify the effects of SMEs’ ownership characteristics, strategy and diversity on innovation and export success.

Alongside the internal enablers of innovation and exporting our review also emphasises the potential importance of the external enablers of SME innovation and exports, emphasising the importance of the eco-system within which SMEs are operating. Such eco-systems, including both private and public institutions, may either be enabling or hindering in the resources they offer to SMEs at different points in their strategic development. Market failures may be important here: however, system failures related to interaction or connectivity deficits may also be important constraints on SME performance providing a potential rationale for policy intervention. It has been argued, for example, that governments should intervene to ‘construct advantage’ (Asheim et al. 2007), i.e. to:

‘address systemic failures that block the functioning of innovation systems or hinder the flow of knowledge and technology ... Such systemic failures can emerge from mismatches between the different components of an innovation system, such as conflicting incentives for market and non-market institutions (e.g. enterprises and the public research sector), or from institutional rigidities based on narrow specialisations or asymmetric information’ (OECD 1999, p. 10).

Table 1: Overview of areas of agreement and contention

	Internal Enablers	External Enablers	Innovation, Exporting and Growth
<i>Areas of Agreement</i>	High quality skills contribute positively to innovation and exporting success.	Purposive links formed by between SMEs can play a positive role in innovation and export growth.	There is a strong positive association between innovation, exporting and performance in terms of productivity and/or growth.
	The importance of technical skills is also increasingly matched by the value of networking and team-working skills.	SME links are likely to be more positive in ‘stronger’ eco-systems and where SMEs have greater absorptive capacity.	Innovation and exporting appear to work jointly to improve performance.
	There is strong positive relationship between R&D and innovation across all firm size bands and industries.	Targeted public support for innovation and exporting yield significant additionality.	There is a substantial element of interdependence between innovation and exporting, and self-selection is common.
	Innovation and export success are positive related to firms’ physical capital investments	Demand-side factors can provide an important stimulus to both innovation and exporting.	
	A positive relationship exists between innovation and export activity and strong cash-flow and liquidity.	The evidence emphasises the positive role of consumer or user-led innovation and public procurement in stimulating SME development.	

<i>Areas of contention</i>	Robust evidence on the role of people management and employee engagement in shaping firms' innovation and exports is limited, particularly in SMEs.	Relatively little is known about the mechanisms through which the gains from 'being there' operate, particularly for SMEs.	Evidence on SMEs is fairly patchy – specifically, we know little about how much the innovation-exporting-performance relationship involves self-selection for SMEs.
	There has been little rigorous analysis of the returns to design in SMEs.	It is unclear which eco-system characteristics are influential for SMEs' innovation and export success.	Information on different types of innovation and their effects on SME performance is limited.
	The innovation and export benefits of IP management in SMEs remain poorly understood.	Third, it is unclear which types of purposive linkages have the greatest benefits for SMEs, particularly in terms of supporting export development.	Evidence on the performance implications of intermittent exporting by SMEs is limited.
	The links between workforce diversity, and other firm characteristics such as family ownership, and firms' innovation and export success remain little explored.	There is some uncertainty about the importance of learning by exporting for SMEs.	What should the key measure be? Productivity is the key issue in many studies, following the theoretical literature, but should (sales) growth be the key performance measure?
	Relatively little is known about the relationship between business strategy and planning and innovation and exporting success in SMEs.		

In terms of SME innovation and exporting, however, our understanding of the impact of different eco-system components remains very incomplete. One recent review, focussed on the UK eco-system for innovation, identified five ‘relatively strong’ aspects – the public research base, competition and entrepreneurial activity, human capital and infrastructure and services (Allman et al. 2011). Two other aspects of the environment provided more concern. First, on the basis of data from the WEF Global Competitiveness Report, the availability of finance in the UK was described as ‘moderate to poor’ by international standards. There is also some more specific evidence from Canada which suggests that SMEs which are seeking to innovate and/or export are likely to experience higher turn-down rates when applying for loan finance than other SMEs (Riding et al. 2012). Evidence on this point is limited in the UK. The international evidence suggests, however, that general measures to promote liquidity in SMEs remain important for innovation and exporting, and also that more specifically targeted initiatives to de-risk these activities through loan or credit guarantees are also likely to be important in improving access to finance for innovative and export-oriented SMEs. The expectation would be that resulting innovation and exporting would help to establish the type of virtuous circle described earlier allowing firms to generate export earnings, overcome capital constraints and increase capital investment (Shaver 2011).

Second – and despite their importance - demand conditions in the UK are said to be only ‘moderately favourable’ to innovation with both consumer and business demand for innovative products lagging other advanced economies. For SMEs this means that the UK market stimulus for innovation is relatively weak compared to that of export markets, reinforcing the importance of exporting as a driver for UK innovation. For the UK government this suggests the potential value of continuing to strengthen demand for innovative products from SMEs through mechanisms such as public procurement and schemes such as the Small Business Research Initiative (SBRI)⁶.

The penalty for bottlenecks approach suggests that a focus on ‘de-bottlenecking’ the access to finance and demand-side aspects of the UK eco-system may create significant benefits by bringing other currently under-utilised system resources into use, an approach which may have policy application elsewhere.

⁶ The UK lags international best practice in this respect with opportunities at both national and regional level. See for example publications at: <http://underpin.portals.mbs.ac.uk/>.

Creating a conducive eco-system is a necessary but not sufficient condition to promote innovation and exporting success among SMEs (House of Commons Science and Technology Committee, 2013). The eco-system becomes most valuable when SMEs take full advantage of the resources it offers. In part this reflects firms' internal absorptive capacity – itself strongly dependent on firms' skills and R&D investments – but it may also depend on SMEs' ability or willingness to develop innovation and export partnerships. In other words, this suggests that there may be a role for public agencies in helping SMEs to overcome informational barriers and identify innovation and export partners. Such interventions may in part be justified on public policy grounds because of recent evidence on 'externalities of openness' – the finding that firms operating in an environment of dense innovation networks tend to benefit in innovation terms even if the individual firm itself is not particularly 'open' or well networked (Roper et al. 2013). More work is required to determine whether such externalities can benefit SMEs, but if this is the case – and given the evidence reviewed above that SMEs can benefit more from some forms of openness than larger firms – this may well be an area worthy of policy scrutiny at both the national and potentially more local (e.g. LEP) level.

The evidence discussed above also indicates clear synergies between innovation and exporting, and the importance of considering them jointly when attempting to maximise the performance benefits of either. It should be stressed that more research is required to be certain that the innovation-exporting-performance nexus operates as clearly for SMEs as it does for larger firms: nevertheless, there are lessons for policy here. Specifically, the evidence, suggests the value of coordinated policy support, with either a single agency responsible for both innovation and export support or at least a closely alignment between policy on both areas. Equally important, however, is ensuring that the day-to-day support offered to individual SMEs seeking to develop their innovation and exporting performance is as seamless and locally accessible as possible (House of Commons Science and Technology Committee, 2013, pp. 34-36).

References

Allman K Edler J Georghiou L Jones B Miles I Omidvar O Ramlogan R Rigby J (2011) Measuring Wider Framework Conditions for successful innovation: A systems review of UK and international innovation data. *Innovation Index Report* London: NESTA.

Asheim B Coenen L Moodysson J and Vang J (2007) Constructing knowledge-based regional advantage: implications for regional innovation policy. *International Journal of Entrepreneurship and Innovation Management*, 7: 140-155.

Audretsch DB (2002) The Dynamic Role of Small Firms: Evidence from the US. *Small Business Economics* 18(1-3): 13-40.

Aw BY Roberts MJ Winston T (2007) Export market participation, investments in R&D and worker training, and the evolution of firm productivity. *The World Economy* 30: 83-104.

Beamish PW Lu JW (2006) SME internationalization and performance: growth vs profitability. *Journal of International Entrepreneurship* 4: 27-48.

Bellone F Musso P Nesta L Schiavo S (2010) Financial Constraints and Firm Export Behaviour. *World Economy* 33(3): 347-373.

Berends H Reymen I Stultiens RGL Peutz M (2011) External designers in product design processes of small manufacturing firms. *Design Studies* 32(1): 86-108.

BERR (2008) *High Growth Firms in the UK: Lessons from an Analysis of Comparative UK Performance*, BERR Economics Paper No 3.

BIS (2010) *Internationalisation of Innovative and High Growth Firms*, Economics Paper No 5.

BIS (2011) *International Trade and Investment – the Economic Rational for Government Support*, Economics Paper No 13.

Blackburn, RA (2003) *Intellectual Property and Innovation Management in Small Firms*. London: Routledge.

Bonaccorsi, A (1992) On the relationship between firm size and export intensity. *Journal of International Business Studies*, 23: 605–635.

Braczyk, HJ Cooke, P Heidenreich M (1998) *Regional innovation Systems: the role of governance in a globalised world*. London and Pennsylvania: UCL Press.

Brambilla, I Lederman D Porto G (2012) Exports, Export Destinations, and Skills. *American Economic Review* 102: 3406-3438.

Bresnahan, TF Gambardella A (2004) *Silicon valley and its imitators*, Cambridge: Cambridge University Press.

Brunswicker, S and Vanhaverbeke, W (2011). Beyond Open Innovation in Large Enterprises: How Do Small and Medium-Sized Enterprises (SMEs) Open Up to External Innovation Sources?

Buddelmeyer H Jensen PH Webster E (2010). Innovation and the determinants of company survival. *Oxford Economic Papers*, 62(2): 261-285.

Cainelli G Evangelista R Savona M (2006) Innovation and Economic performance in services: a firm-level analysis. *Cambridge Journal Of Economics* 30: 435-458.

Cassiman B Golovko E Martínez-Ros E (2010) Innovation, exports and productivity. *International Journal of Industrial Organization* 28: 372-376.

Cereda M Crespi G Criscuolo C Haskel JM (2005) Design and Company Performance: Evidence from the Community Innovation Survey. DTI Report London

Chesborough HW (2003) *Open Innovation* Harvard: Harvard University Press.

Clausen T Pohjola M Sapprasert K Verspagen B (2012) Innovation strategies as a source of persistent innovation. *Industrial and Corporate Change* 21(3): 553-585.

Comacchio A Bonesso S Pizzi C (2012) Boundary spanning between industry and university: the role of Technology Transfer Centres. *Journal of Technology Transfer* 37: 943-966.

Combes R Duranton, G Gobillion, L and Puga, D (2009) The Productivity Advantages of Large Cities: Distinguishing Agglomeration from Firm Selection. SERC Research Paper SERCDP0027.

Cooney R (2010) Exploring Skill Ecosystems in the Australian Meat Processing Industry: Unions, Employers and Institutional Change. *Economic and labour relations review* 21: 121-138.

Crepon A Hughes A Lee M Mairesse J (1998) Research, Innovation and Productivity: An econometric analysis at the firm level. *Economics of Innovation and New Technology* 7: 115-158.

Crick D (2003) The international entrepreneurial decision of UK SMEs to discontinue overseas activities: A research note reporting practices within the clothing industry. *Journal of International Entrepreneurship* 1(4): 405-413.

Cui, AS O'Connor G (2012) Alliance Portfolio Resource Diversity and Firm Innovation. *Journal of Marketing* 76: 24-43.

Design Council (2012) Designing Demand – National Evaluation 2007-2012. Report by Eden Partners, May 2012.

Driffield N Du J Hart M Love J H Tapinos E (2010) A Comparative Evaluation of the Impact of UK Trade & Investments R&D Programme and other UKTI Support that Impacts R&D. Report for UK Trade and Investment.

Eckaus, R S (2008) An inquiry into the determinants of the exports of China and India. *China & World Economy* 16(5): 1-15.

Eliasson, K Hansson, M Lindvert M (2012) Do firms learn by exporting or learn to export? Evidence from small and medium-sized enterprises. *Small Business Economics* 39: 453-472.

Esteve-Perez S Manez-Castillejo JA Sanchis-Llopis JA (2008) Does a survival-by-exporting effect for SMEs exist? *Empirica* 35: 81-104.

European Commission (2010) Internationalisation of European SMEs, Directorate-General for Enterprise and Industry, Brussels.

Flor M Oltra MJ (2005) The influence of firms technological capabilities on export performance in supplier-dominated industries: the case of ceramic tiles firms. *R&D Management* 35(3): 333-347.

Foreman-Peck, J (2013) Effectiveness and efficiency of SME innovation policy, *Small Business Economics* 41(1): 55-70.

Freel, MS (2005) Patterns of Innovation and skills in small firms. *Technovation* 25: 123-134.

Freel, MS Robson PJA (2004) Small firm innovation, growth and performance - Evidence from Scotland and northern England. *International small business journal* 22: 561-575.

Freeman J Styles C Lawley M (2012) Does firm location make a difference to the export performance of SMEs? *International Marketing Review* 29: 88-113.

Ganotakis P Love JH (2012) Export Propensity, Export Intensity and Firm Performance: the Role of the Entrepreneurial Founding Team. *Journal of International Business Studies* 43: 693-718.

Ganotakis P Love JH (2012) The Innovation Value Chain in New Technology-Based Firms: Evidence from the UK. *Journal of Product Innovation Management* 29: 839-860.

Ganotakis P Love JH (2011) R&D, product innovation, and exporting: evidence from UK new technology based firms. *Oxford Economic Papers-New Series* 63: 279-306.

Garcia-Morales VJ Jimenez-Barrionuevo MM Gutierrez-Gutierrez L (2012) Transformational leadership influence on organizational performance through organizational learning and innovation. *Journal of business research* 65(7): 1040-1050.

- Gemser, G Leenders M (2001) How integrating industrial design in the product development process impacts on company performance. *The Journal of Innovation Management*, 18: 28-38.
- Glückler J (2013) Knowledge, Networks and Space: Connectivity and the Problem of Non-Interactive Learning. *Regional Studies* 47: 880-894.
- Goffin K Micheli P (2010) Maximising the value of industrial design in new product development. *Research-Technology Management* 53(5): 29-37.
- Golovko E Valentini G (2011) Exploring the complementarity between innovation and export for SMEs growth. *Journal of International Business Studies* 42: 362-380.
- Griffith R Redding S Van Reenan J (2003) R&D and Absorptive Capacity: Theory and Empirical Evidence. *Scandinavian Journal of Economics* 105(1): 99-118.
- Griliches Z (1995) *R&D and Productivity: Econometric Results and Measurement Issues* Oxford: Blackwell.
- Grossman GM Helpman E (1991) Trade, Knowledge Spillovers, and Growth. *European Economic Review* 35: 517-526.
- Gumede V (2004) Export propensities and intensities of small and medium manufacturing enterprises in South Africa. *Small Business Economics* 22: 379-389.
- Haahti A Madupu V Yavas U Babakus E (2005) Cooperative strategy, knowledge intensity and export performance of small and medium sized enterprises *Journal of World Business* 40(2): 124-138.
- Hall BH Lotti F Mairesse J (2009) Innovation and productivity in SMEs: empirical evidence for Italy. *Small Business Economics* 33: 13-33.
- Harris R Li Q C (2010) Study Of The Relationship Between Innovation, Exporting and the Use of E-Commerce (CIS 2007), UKTI/CIS(2007) 0901, UK Trade & Investment
- Harris R and Moffatt J (2011) R&D, Innovation and Exporting, SERC Discussion Paper 73, Spatial Economics Research Centre
- Harris RID and Li QC (2009) Exporting, R&D, and absorptive capacity in UK establishments. *Oxford Economic Papers* 61: 74-103.
- He ZL Wong PK (2012) Reaching Out and Reaching Within: A Study of the Relationship between Innovation Collaboration and Innovation Performance. *Industry and Innovation* 19: 539-561.

Helpman E Melitz M and Yeaple S (2004) Export versus FDI with heterogeneous firms. *American Economic Review* 94: 300–16.

Herrmann, AM and A Peine (2011) When national innovation system meet varieties of capitalism arguments on labour qualifications: On the skill types and scientific knowledge needed for radical and incremental product innovations *Research Policy* 40: 687-701.

Hewitt-Dundas N Roper, S (2009) Output Additionality of Public Support for Innovation: Evidence for Irish Manufacturing Plants. *European Planning Studies* 18: 107-122.

Holgersson M (2013) Patent management in entrepreneurial SMEs: a literature review and an empirical study of innovation appropriation, patent propensity, and motives. *R&D Management*, 43(1): 21-36.

House of Commons Science and Technology Committee (2013) Bridging the valley of death: improving the commercialisation of research. London: HMSO.

Iammarino S Piva M Vivarelli M Von Tunzelmann N (2012) Technological Capabilities and Patterns of Innovative Cooperation of Firms in the UK Regions. *Regional Studies* 46: 1283-1301.

Ibrahim SE and Ogunyemi O (2012) The effect of linkages and information sharing on supply chain and export performance. *Journal of Manufacturing Technology Management* 23: 441-463.

Jones MV (2001) First steps in internationalisation: Concepts and evidence from a sample of small high-technology firms. *Journal of International Management* 7(3): 191–210.

Jones O Craven M (2001) Beyond the routine: innovation management and the Teaching Company Scheme. *Technovation* 21: 267-279.

Keupp MM, et al (2012) The Strategic Management of Innovation: A Systematic Review and Paths for Future Research. *International Journal of Management Reviews* 14(4): 367-390.

Knight GA Kim D (2009) International business competence and the contemporary firm. *Journal of International Business Studies* 40: 255-273.

Lanjouw JO Schankerman M (2003) Protecting Intellectual Property Rights: Are Small Firms Handicapped *Journal of Law and Economics* 47(1): 45-74.

Laursen, K Salter A (2006) Open for Innovation: The role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal* 27: 131-150.

Leiponen A (2005) Skills and innovation. *International Journal of Industrial Organization* 23: 303-323.

- Leiponen A (2012) The benefits of R&D and breadth in innovation strategies: a comparison of Finnish service and manufacturing firms. *Industrial and Corporate Change* 21: 1255-1281.
- Leiponen A Byma J (2009) If you cannot block, you better run: Small firms, cooperative innovation, and appropriation strategies. *Research Policy* 38(9): 1478-1488.
- Leydesdorff L Etkowitz H (1998) The Triple Helix as a Model for Innovation Studies. *Science & Public Policy* 25 (3): 195-203.
- Lichtenthaler U (2010) Intellectual property and open innovation: an empirical analysis. *International Journal of Technology Management* 52 (3-4): 372-391.
- Love JH Ganotakis P (2013) Learning by Exporting: Lessons from high-technology SMEs. *International Business Review* 22: 1-17.
- Love JH Roper S Du J (2009) Innovation, Ownership and Profitability. *International Journal of Industrial Organization* 27(3): 424-434.
- Love JH, Roper S Bryson J (2011) Knowledge, Openness, Innovation and Growth in UK Business Services. *Research Policy* 40(10): 1438-1452.
- Love JH Hewitt-Dundas N Roper S (2010) Service Innovation, Embeddedness and Business Performance. *Regional Studies* 44: 983-1004.
- MacPherson A (2000) The role of international design orientation and market intelligence in the export performance of US machine tool companies. *R&D Management* 30(2): 167-176.
- Mamuneas T Nadiri MI (1996) Public R&D policies and cost behaviour of the US manufacturing industries. *Journal of Public Economics* 63: 57-81.
- McCloud D Clarke N (2009) *Engaging for Success: enhancing performance through employee engagement*. Department for Business, Innovation and Skills, London
- Millward H Lewis A (2005), Barriers to successful new product development within small manufacturing companies. *Journal of Small Business and Enterprise Development* 12(3): 379-394.
- Mowery D Rosenberg N (1979) The influence of market demand upon innovation A critical review of some recent empirical studies. *Research Policy*, 8(2): 102-153.
- Nathan, M (2013) Top Team Demographics, Innovation and Business Performance: Findings from English Firms and Cities 2008-9, SERC Research Paper No SERCDP0129.
- OECD (1999) *Managing National Innovation Systems* Paris: OECD.

- Oke A Burke G Myers A (2007) Innovation types and performance in growing UK SMEs. *International Journal of Operations & Production Management* 27: 735-753.
- Pellegrino G Piva M Vivarelli, M (2009) How do young companies innovate? IZA Discussion Paper DP No 4301.
- Piergiovanni R Santarelli E Vivarelli M (1997) From which source do small firms derive their innovative inputs? Some evidence from Italian industry. *Review of Industrial Organization* 12(2): 243-258.
- Ricci LA Trionfetti F (2012) Productivity, networks and export performance: evidence from a cross-country dataset. *Review of International Economics* 20: 552-562.
- Riding A Orser BJ Spence M Belanger B (2012) Financing new venture exporters. *Small Business Economics* 38: 147-163.
- Rogers M Helmers C Greenhalgh, C (2007) An analysis of the characteristics of small and medium enterprises that use intellectual property, IPO research report.
- Roper S Vahter P and Love JH (2013) Externalities of openness in innovation. *Research Policy* 42: 1544-1554.
- Roper S Du, J Love JH (2008) Modelling the Innovation Value Chain. *Research Policy* 37: 961-977.
- Rosing K Frese M Bausch M (2011) Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership. *Leadership Quarterly* 22: 956-974.
- Seo HJ Lee YS Kim H (2012) The determinants of export market performance in Organisation for Economic Co-operation and Development service industries. *Service Industries Journal* 32(8): 1343-1354.
- Shaver JM (2011) The benefits of geographic sales diversification: how exporting facilitates capital investment. *Strategic Management Journal* 32: 1046-1060.
- Shefer D Frenkel A (1998) Local Milieu and Innovations: Some Empirical Results. *Annals of Regional Science* 32: 185-200.
- Stöttinger B Holzmüller HH (2001) Cross-national Stability of an Export Performance Model - A Comparative Study of Austria and the US. *Management International Review* 41: 7-28.
- Toedtling F Lengauer L Hoeglinger C (2011) Knowledge Sourcing and Innovation in Thick and Thin Regional Innovation Systems-Comparing ICT Firms in Two Austrian Regions. *European Planning Studies* 19(7): 1245-1276
- Tomiura E (2007) Effects of R&D and networking on the export decision of Japanese firms. *Research Policy* 36: 758-767.

Trajtenberg M (2000) R&D Policy in Israel: An Overview and Reassessment: NBER Working Paper No. 7930.

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.

Vaccaro IG Jansen JJP Van Den Bosch FAJ Volberda HW (2012) Management Innovation and Leadership: The Moderating Role of Organizational Size. *Journal of Management Studies* 49(1): 28-51.

Van de Vrande V de Jong JPJ Vanhaverbeke W de Rochemont M (2009) Open innovation in SMEs: trends, motives and management challenges. *Technovation* 29: 423-437.

Verganti R (2009) Design-driven innovation, Boston, Massachusetts: Harvard Business Press.

Veugelers R Cassiman B (1999) Make and Buy in Innovation Strategies: Evidence from Belgian manufacturing firms. *Research Policy* 28: 63-80.

Vossen RW (1998) Relative Strengths and Weaknesses of Small Firms in Innovation. *International small business journal* 16: 88-95.

Wagner J (2007) Exports and productivity: a survey of the evidence from firm-level data. *The World Economy*, 30: 60-82.

Welch CL and Welch LS (2009) Re-internationalisation: exploration and conceptualisation. *International Business Review*, 18: 567-577.

Wheeler C Ibeh K Dimitratos P (2008) UK export performance research - Review and implications. *International small business journal* 26(2): 207-239.