

Ebersberger, Bernd; Herstad, Sverre

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The impacts of urban location on the involvement of knowledge-intensive services in international innovation collaboration

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The impacts of urban location on the involvement of knowledge-intensive services in international innovation collaboration

Sverre J. Herstad

University of Agder

Bernd Ebersberger

MCI

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Abstract

Research on territorial innovation systems has traditionally put a very strong emphasis on intra-economy collaborative linkages as they allow valuable tacit knowledge to flow between co-located firms and institutions. Frequent face-to-face contact between producers and demanding users combined with institutionalized trust nurtured by proximity has been seen as conducive to advanced new knowledge development, structural change and growth. This is visible not least in the literature on knowledge-intensive business services, which emphasizes the role of proximity between providers and a demanding client base.

However, collaborative linkages can span large distances and are increasingly regarded as a mechanism by which firms overcome local supply and demand side limitations. The rapid diffusion of ICTs has increased the scope for service firm, by increasing tradability and by allowing more efficient international market search. At the same time, regions remain important as 'containing social structures' for labor flows and information diffusion through interpersonal networks, for new firm formation based on localized knowledge assets, and as platforms for growth and internationalization. The locus of innovation is therefore shifting away from individual firms, towards territorial economies and the distributed innovation networks by which they are linked.

Knowledge intensive business services are important in this context, as they are positioned at the intersection between corporate demand for specialized knowledge, and the supply of this knowledge from various actors and locations. Yet, the literature on internationalization in services focuses primarily on demand side enablers in the form of trade liberalization and modern ICTs, and drivers in the form of larger and more diverse markets. Consequently, it has yet to acknowledge the embeddedness of knowledge-intensive business services in international innovation collaboration networks more broadly.

This paper starts from the recognition that collaborative linkages may be conditioned by contexts of location, in particular when they are extended into distant business communities. This paper analyses the link between urban locations, and the involvement of knowledge-intensive business service firms in international innovation collaboration. It extends current research on the internationalization of business services by distinguishing between demand and supply side linkages in international innovation collaboration. The empirical analysis uses establishment level innovation data available from the Sixth Norwegian Community Innovation Survey (CIS2008) to investigate whether urban location affects a firm's involvement in global innovation collaboration. Everything else equal knowledge-intensive business service firms located in the Norwegian capital region are found to be more involved in international collaboration than establishments located at any other level of centrality. This is not driven by the more intense interaction with clients and customers. Rather, it is most distinctively driven by broader linkages with knowledge supplying actors.

Introduction

Research on territorial innovation systems has traditionally put a very strong emphasis on intra-economy collaborative linkages (Asheim, 1996, 1999; Edquist, 1997; Fritsch & Franke, 2004; Henderson, 2007; Krugman, 1991; Romer, 1990), as they allow valuable tacit knowledge (Currah & Wrigley, 2004; G Szulanski, 2003; Tether, 2002; von Hippel, 1994) to flow between co-located firms and institutions. Frequent face-to-face contact between producers and demanding users combined with institutionalized trust nurtured by proximity has been seen as conducive to advanced new knowledge development, structural change and growth. This is visible not least in the literature on knowledge-intensive business services, which emphasizes the role of proximity between providers and a demanding client base (Aslesen & Isaksen, 2007a; Aslesen & Jakobsen, 2007).

However, collaborative linkages can span large distances (Adams, 2002; Torre, 2008; Torre & Rallett, 2005) and are increasingly regarded as a mechanism by which firms overcome local supply and demand side limitations (e.g. Bathelt, Malmberg, & Maskell, 2004; Herstad, Bloch, Ebersberger, & van De Velde, 2010; Laursen, Reichstein, & Salter, 2011; Owen-Smith & Powell, 2004; Sturgeon, 2003). The rapid diffusion of ICTs has increased the scope for service firm internationalization (Castellacci, 2010; Knight & Cavusgil, 2004; Wymbs, 2000), by increasing tradability (O'Farrell, Zheng, & Wood, 1996) and by allowing more efficient international market search. At the same time, regions remain important as 'containing social structures' (Lam, 2000) for labor flows and information diffusion through interpersonal networks (Agrawal, Cockburn, & McHale, 2006; Dahl & Pedersen, 2004; Sturgeon, 2003; Verspagen & Schoenmakers, 2000), for new firm formation based on localized knowledge assets (Agarwal, Echambadi, Franco, & Sarkar, 2004; Anselin, Varga, & Acs, 1997; Bottazzi & Peri, 2003; Feldman, 2000; Klepper, 2001), and as platforms for growth (Gilbert, McDougall, & Audretsch, 2006) and internationalization (Fernhaber, Gilbert, & McDougall, 2008; Porter, 1990). The locus of innovation is therefore shifting away from individual firms, towards territorial economies (Nachum & Keeble, 2003; Owen-Smith & Powell, 2004) and the distributed innovation networks (OECD, 2008; Unctad, 2005) by which they are linked (Raco, 1999; Samiee, 1999; Simmie, 2003, 2004; Wood, 2006).

Knowledge intensive business services are important in this context, as they are positioned at the intersection between corporate demand for specialized knowledge, and the supply of this knowledge from various actors and locations (Bettencourt, Ostrom, Brown, & Roundtree, 2002; Evangelista, 2000; Gallouj & Weinstein, 1997; Hargadon & Sutton, 1997; Miozzo & Soete, 2001; Sundbo & Gallouj, 2000). Yet, the literature on internationalization in services focuses primarily on demand side enablers in the form of trade liberalization and modern ICTs, and drivers in the form of larger and more diverse markets (Bryson, 2001; Clark & Rajaratnam, 1999; Clark, Rajaratnam, & Smith, 1996; Javalgi, Griffith, & White, 2004; Samiee, 1999). Consequently, it has yet to acknowledge the embeddedness of knowledge-intensive business services in international innovation collaboration networks more broadly (Castellacci, 2010; Todtling, Lehner, & Trippl, 2006).

This paper starts from the recognition that collaborative linkages may be conditioned by contexts of location (Laursen, et al., 2011), in particular when they are extended into distant business communities (Fernhaber, et al., 2008; O'Farrell, et al., 1996). It uses establishment level innovation data available from the Sixth Norwegian Community Innovation Survey (CIS2008) to investigate whether urban location affects a firm's involvement in global innovation collaboration. To isolate the impact of the business context, the empirical analysis is restricted to establishments, which are

independent, i.e. not among several sub-units of enterprises, which may or may not have service provision as their primary field of activity.

Conceptual framework

International innovation collaboration entails the extension of new knowledge development into the realm of global networks. It is different from information search and processing (Laursen & Salter, 2006; Rosenkopf & Almeida, 2003; Rosenkopf & Nerkar, 2001; Sofka & Grimpe, 2010) in that it involves direct contact with external actors (Ebersberger & Herstad, 2011b; Fey & Birkinshaw, 2005; Tether, 2002). Furthermore, it is different from technology transfer through commodity markets (Hauknes & Knell, 2009), global production networks (Coe, Dicken, & Hess, 2008; Gereffi, Humphrey, & Sturgeon, 2005; Sturgeon, Van Biesebroeck, & Gereffi, 2008) and contract R&D (Grimpe & Kaiser, 2010; Weigelt, 2009) in that it involves not only knowledge developed at arm's length, the results of which are codified in documents or embodied in products, but it extends into what is disembodied, tacit and evolving (Dachs, Ebersberger, & Pyka, 2008; de Jong & Freel, 2009; Fey & Birkinshaw, 2005; Tether, 2002). Collaboration involves varying degrees of direct access to the competences of partners and therefore indirect linkages to their networks. The diversity of foreign business contexts into which an establishment is linked by means of a collaborative relationships is therefore a strong indicator of its embeddedness in global innovation networks (Asheim, Ebersberger, & Herstad, 2012).

Social, cultural and institutional distance (Boschma, 2005) reinforces strategic and organizational challenges inherent to collaboration (Arranz & de Arroyabe, 2007; de Jong & Freel, 2009; Doz, Wilson, & Veldhoen, 2006; Lane & Lubatkin, 1998; Nootboom, Van Haverbeke, Duysters, Gilsing, & van den Oord, 2007), as distance imposes constraints related to partner search, monitoring, and weak institutionalized trust. Distant collaboration therefore necessitates active partner search and construction of administrative and organizational contexts around the subsequent interaction (Torre & Rallett, 2005). Consequently, it is prone to lock-in effects due to the high marginal costs involved in identifying new partners, changing current network configurations (Narula, 2002) and adapting organizational systems to new needs. The geographical reach of collaboration is therefore the outcome of how firm-level characteristics and strategies evolve with various – often exogenously given, and often contradictory – centrifugal and centripetal forces (Benito, Larimo, Narula, & Pedersen, 2002).

At present, high rates of technological development combine with territorial industrial specialization and geographical differentiation of advanced demand, and translate into opportunities for service development and provision which can be harnessed through internationalization on both demand (customers) and supply (other knowledge providers) sides. However, these centrifugal forces merge with search constraints imposed on the firm by its pre-existing network linkages (Rosenkopf & Almeida, 2003), with transaction costs (Arranz & de Arroyabe, 2007) related to complexity and uncertainty in development work (Torre, 2008), and with 'stickyness' (von Hippel, 1994) due the embeddedness of learning and innovation in the minds and ongoing practices of individual experts (Dougherty, 1992, 2004). The sensitivity of any KIBS towards centrifugal and centripetal forces are likely to be particularly strong on the supply side, i.e. with respect to international linkages beyond those maintained with customer firms as an integral part of ongoing service provision.

The geographic location of the firm represents a physical space within which resource become available to it (Dunning, 1998; Fernhaber, et al., 2008; O'Farrell, Hitchens, & Moffat, 1993; Porter, 1990), and can therefore mediate the centrifugal and centripetal forces of globalization. Service development and provision is tightly linked to customer interaction (Gallouj, 2002; Gallouj & Weinstein, 1997; Skjølsvik, Løwendahl, Kvålshaugen, & Fosstenløykken, 2007; Tether, 2003), and thus to the diverse demand base offered by urban economies (Aslesen & Isaksen, 2007a; Aslesen & Jakobsen, 2007; Frenken, Oort, & Verburg, 2007; Glaeser, Kallal, Scheinkman, & Shleifer, 1992). This enables the firm to more rapidly build the specialized knowledge resources and organizational capabilities necessary to internationalize. At the supply side, service providers rely on individual expert knowledge (Mats Alvesson & Kärreman, 2007; Freel, 2006; Løwendahl, 2000; von Nordenflycht, 2011). This translates into a strong dependence on knowledge upgrading by means of employment (Freel, 2006; Keeble & Nachum, 2002; Tether, 2003; Todtling, et al., 2006). Because job mobility is a key localized externality of urban agglomerations (Eriksson, Lindgren, & Malmberg, 2008; Henry & Pinch, 2000), the external labor markets of urban economies provide abundant access to competences, which reflect the diversity of its industrial base (O'Farrell, et al., 1993; Zardkoohi, Bierman, Panina, & Chakrabarty, 2011). Furthermore, it contributes to the embedding of the establishment in the interpersonal networks that reflect the diverse backgrounds of its employees (Agrawal, et al., 2006; Dahl & Pedersen, 2004). These networks evolve through the local (Sturgeon, 2003) , domestic (Aslesen, Isaksen, & Stambøl, 2008; Stambøl, 2005) and international (Oettl & Agrawal, 2008) mobility flows, which converge on urban economies, and which are of particular importance for the ability of KIBS to identify new opportunities (Aslesen & Isaksen, 2007b; Keeble & Nachum, 2002; Robertson, Scarbrough, & Swan, 2003; Todtling, et al., 2006).

Establishments, which are independent, can be assumed to be more sensitive to external demand and supply conditions, than establishments which are part of larger enterprise systems. Although rarely recognized by the literature, this is an important point because it is increasingly common for enterprises in different industries to establish dedicated R&D, marketing or financial services units. The reliance of business services on face-to-face contact with the customer suggests a particularly strong need to set up marketing and sales establishments in different geographical markets. Affiliation with multi-establishment enterprises may come with internal knowledge supply and services demand, and reduce the sensitivity of the service providing unit towards contextual influences as well as reduce their ability to act according to such.

Furthermore, contextual influences as such can be expected to be strongest in capital regions. This is because higher order government functions, public knowledge institutions and corporate headquarter functions concentrate in such regions (Aslesen & Jakobsen, 2007; Wood, 2006), and position them as gravitation nodes in international industrial, academic and public administration networks (Breschi & Lenzi, 2010; Fischer, Revilla Diez, & Snickars, 2000; Graf, 2010; Keeble & Nachum, 2002; Simmie, 2003, 2004; Wood, 2002). This increases the exposure of within-region informal networks to information originating outside (Giuliani & Bell, 2005; Lazaric, Longhi, & Thomas, 2008; Owen-Smith & Powell, 2004). Headquarters (Gupta & Govindarajan, 2000) and other strategic functions with a coordinating role (Benito, Larimo, Narula, & Pedersen, 2002) form information gravitation points within multinational corporate network. Labor market (Balsvik, 2011 ; Ebersberger, Lehtoranta, & Herstad, 2011; Pesola, 2011) and supply linkages (Karagozoglu & Lindell, 1998), to these information gravitation points come with the potential of information spillovers

(Aslesen & Jakobsen, 2007; Ebersberger & Herstad, 2011a; Jakobsen & Onsager, 2005) according to which the independent KIBS establishment can act.

From this follows that location-specific information externalities (Bennett, Robson, & Bratton, 2001:1553, 1540-1548; Casson, 1997; Keeble & Nachum, 2002) should serve as a catalyst for international innovation collaboration by independent capital region KIBS (Coviello & Munro, 1995; Fernhaber, et al., 2008; O'Farrell, et al., 1996). Furthermore, it suggests that this effect should be strongest for collaborative linkage formation beyond those following from market presence and serve provision itself, i.e., supply side linkages.

Empirical analysis

Community innovation survey data

The empirical analysis is based on data from the Sixth Norwegian Community Innovation Survey (CIS2008), collected by Statistics Norway in 2008 as an extended version of the harmonized European survey (Eurostat, 2010; OECD, 2005). Participation was compulsory for sampled Norwegian firms. This resulted in a comparatively large data set, which is not plagued by a non-response bias. CIS2008 was sampled and reported at the enterprise level. Because the commercial and technological activities of the enterprise may be carried out by several individual establishments, which may be located in other regions than the legal entity reporting the activity, multi-establishment enterprises were in Norway asked to provide information on the basic characteristics of all such establishments. This allows single establishment enterprises, and thus independent establishments, to be identified.

Knowledge-intensive business services

The data set contains information on the innovation activities of 6,029 enterprises, with supplementary information on 9,942 establishments in manufacturing industries, construction and infrastructure activities, wholesale trade and logistics, and knowledge-intensive business services. Among these, a total of 2,359 KIBS establishments are identified. Because different subsectors can be characterized by different incentives to engage in innovation activity (Faulconbridge, 2007; Robertson, et al., 2003; Tether & Hipp, 2002; Tether & Tajar, 2008), all regressions compare postal and communication (NACE 64), computer (NACE 72), R&D (NACE 73) and other consultancy services (NACE 74) to a reference group consisting of financial services (NACE 65-67)¹.

Locations

Previous empirical work using register data on housing and employment has identified 161 Norwegian labor market regions (Jukvam, 2002), and classified these on a centrality scale ranging from 5 (capital region) through 4 (large city regions) into 1 (peripheral). The results of the first set of regressions (Model 1 and Model 2 in Table 1) are used to correct for the selection bias in the analysis of collaborative linkages, which emerge because only independent and innovation-active establishments are included. In these selection regressions, dummy variables indicating location in the capital region (CAPITAL) and any other large city region (BERGEN, STAVANGER, TRONDHEIM) are compared to a reference group consisting of labor market regions at centrality level 1-3. In the final regression of collaborative linkages the capital labor market it is split into three regions. CAPITAL C

¹ Standard for Industrial Classification (SIC), revision 1.1

captures location within the capital city itself, whereas CAPITAL W and CAPITAL NE capture location in the bordering western and north-eastern municipalities.

In 2008 the capital region contains almost one third of all Norwegian R&D personnel, and it represents over 40 per cent of domestic industry expenditures on research, development and innovation (Foyn et al., 2011). It has the highest educated workforce of any Norwegian region (ibid), and throughout the 1990s it experienced net inflow of employees into the KIBS sector (Stambøl, 2005). This overall concentration of human resources, knowledge institutions and industrial R&D come with a strong revealed comparative advantage in knowledge intensive services (Aslesen & Isaksen, 2007a; Aslesen, et al., 2008; Herstad, Paalshaugen, & Ebersberger, 2011).

Sample selection issues

As the empirical analysis include only independent, innovation active KIBS, two selection stages are included based on which Mills’ ratios are calculated. These are both included in the outcome regressions. The age of the establishment strongly affects its growth pattern (Ebersberger, Marsili, Reichstein, & Salter, 2010) . Growth is associated not only with the expansion of the establishment at a given location, but also with new establishments in different locations. Hence the age (LnAGE), measured on a logarithmic scale, should influence the likelihood of independence negatively. As it can be argued that age should not affect the firm’s decision to engage in innovation activity or collaborate for innovation (e.g., Wong & He, 2009), LnAGE is included throughout as an instrument.

The first stage uses only the information on characteristics of all 2,359 KIBS observations provided by the enterprise respondent, and estimate the likelihood of that the focal observation is an independent KIBS (INDEP=1). The results displayed in Table 1 (Model 1) shows that age and size, measured as their respective natural logarithms, significantly reduces the likelihood of independence. The strong, positive impact of capital region location is notable because no significant impacts are detected from location in any of the other urban labor market regions.

The second stage uses the information available from the enterprise level to estimate innovation activity (ACTIVE) among independent KIBS. This variable takes on the value 1, when observations report positive innovation expenditures, ongoing or abandoned innovation projects, or the successful launch of an innovation onto the market during the reference period 2005-2007. This definition of innovation activity is in accordance with the routing structure in the CIS questionnaire. Additional variables included in the regression capture affiliation with a foreign enterprise group (FOREIGN) because these may come with information exposure and financial resources conducive to innovation activity (Ebersberger & Herstad, 2011a; Frenz, Girardone, & Ietto-Gillies, 2005; Frenz & Ietto-Gillies, 2007). However, it also comes with sensitivity of KIBS activity to the roles assigned by distant parents (Cantwell & Mudambi, 2005). The size of the establishment (LnEMP) is known to influence its resource base and thus propensity to engage in innovation (Ebersberger & Herstad, 2011c; Gilbert, et al., 2006), and it is therefore included.

Table 1 approximately here

The dependence of KIBS on face-to-face contact with demanding local customers leads to the assumption that a strong orientation towards these demanding customers triggers innovation

activity. On the other hand, foreign market presence entails larger market size (Achs & Audretsch, 1988; Bhattacharya & Bloch, 2004; Crepon, Duguet, & Mairesse, 1998; Harris & Li, 2005; Rammer, Czarnitzki, & Spielkamp, 2009) and exposure to more diverse information, which signals market and technology opportunity. As this should translate into stronger incentives to engage in innovation, a dummy variables capturing whether the main market is foreign (FORMAR) is included. In the survey all firms are asked to assess how severely their innovation activities are constrained by various factors. HAMPFIN captures strong constraints from lack of internal funding, whereas HAMPKOST captures constraints imposed by high innovation costs. Finally, HAMPRIOR captures whether prior innovations launched by the firm reduces its incentive innovative further.

The results displayed in Table 1 (Model 2) show that the likelihood of innovation activity increases with size. It is higher when the main market is foreign, compared to when it is not. Foreign ownership reduces the likelihood, which suggests that incoming FDI into the Norwegian knowledge-intensive services sector is not predominantly motivated by knowledge seeking strategies. As expected, HAMPRIOR reduces the incentive to engage, whereas perceived funding and cost constraints are positively associated with innovation activity. This indicates that active establishments are more aware of such constraints, than establishments which are not active.

Location in the capital region significantly reduces the likelihood of innovation activity, while location in the second largest town of Bergen significantly increases it. This suggests that knowledge spillovers available through the labor market which surround the dense concentrations of KIBS in the capital region (Aslesen, et al., 2008; Stambøl, 2005) may be reducing their individual incentive to engage in systematic new service development (M Alvensson, 2000; von Nordenflycht, 2011; Zardkoohi, et al., 2011).

Involvement

The CIS2008 questionnaire specifies a total of eight potential collaboration partner groups, which span from downstream customers through suppliers and competitors, into research institutes and universities upstream. The respondent firm is asked to exclude pure contractual relationships, and include only linkages which involve direct exchanges of knowledge (Eurostat, 2010; OECD, 2005). For each partner group, the firm is asked to indicate whether a collaborative interaction has taken place in own region (subjectively defined by the firm itself), elsewhere in Norway or in either one of five world regions specified (Nordic countries, EU excl. Nordic countries, North America, Asia, other).

Table 2 approximately here

This information is used to capture the involvement of the establishment in global innovation collaboration. Our involvement index is constructed in accordance with recent work by Bozeman, Gaughan and Corley (Bozeman & Gaughan, 2011; Gaugan & Corley, 2010) by multiplying each single collaborative linkage with the likelihood that it is *not* present, as calculated based on the average occurrence in the respective NACE 2-digit sector groups. This weights up (relatively) rare linkages, and weights down common ones. We compute a total involvement index (all partner types) and separate indexes for involvement in demand (customers) and supply (suppliers, universities and higher education institutions, private and public R&D laboratories, consultancy firms) collaboration. The descriptive statistics included in Table 2 show particularly strong involvement scores in the

fourth largest city, Trondheim, while involvement scores for capital region KIBS are only slightly above the national average.

Control variables

According to the literature on KIBS internationalization, the main driver of such is foreign markets and the main constraint imposed related to distance decay effects on service provision. Furthermore, the literature suggests that the local demand base is an important determinant of organizational learning conducive to subsequent internationalization. We therefore include two demand side controls. MARLOC capture the presence of the firm on a local market, whereas MARBREADTH capture the share of regions specified (seven in total) in which a market presence is stated.

Collaboration reflects the innovation strategy and absorptive capacity of the firm (Cohen & Levinthal, 1989, 1990), that is the strength and diversity of the internal knowledge base (Nooteboom, et al., 2007) and the organizational systems in which it is embedded (Lane & Lubatkin, 1998; Ocasio, 1997). These characteristics can be assumed to be related to firm size, as increasing size entails more diverse competences, stronger management capabilities and better developed organizational systems (e.g. Gilbert, et al., 2006). Smaller size, by implication, increases the sensitivity of the firm towards resources in their external environments (Fernhaber, et al., 2008). Consequently, larger size may either increase the propensity of the firm to collaborate, due to absorptive capacity effects, or reduce this propensity due to the lower dependence on external resources which can follow from stronger internal capabilities. We therefore control for size by comparing small establishments (< 25 employees) and large establishments (>100 employees) to a reference group consisting of medium sized establishments.

Investments in research and development as share of turnover (RDINT) are used to capture the firm's emphasis on systematic knowledge development (Ebersberger, Herstad, Iversen, Som, & Kirner, 2011; Tether, 2002). R&D intensive firms are more likely to exhaust their local learning potentials quickly (Drejer & Vinding, 2007), and thus strengthen their involvement in global collaboration. Conducting systematic intramural R&D as defined by CIS furthermore implies externalization of knowledge from ongoing practice (Dankbaar, 2003). Such externalization is conducive to the more independent exploration of knowledge (Dougherty, 2004; Lane & Lubatkin, 1998; Løwendahl, 2000), and thus not only to more distant collaboration in general (de Jong & Freel, 2009) but also to stronger involvement on the supply side in particular. R&D also builds internal knowledge resources (DeSarbo, Di Benedetto, & Song, 2007; Fey & Birkinshaw, 2005; Weigelt, 2009). Such internal resources are on the one hand necessary to engage in collaborative work effectively (Cohen & Levinthal, 1989, 1990; Nooteboom, et al., 2007; Zahra & George, 2002), but may on the other reduce the incentive of the establishment to do so. Investments may also take the form of contractual R&D sourcing from external actors (Grimpe & Kaiser, 2010; Teece, 1988). External R&D may serve as a first step towards denser collaborative linkages (Maskell, Pedersen, Petersen, & Dick-Nielsen, 2007); complement existing linkages or eliminate the need for collaboration altogether. A strong orientation towards external R&D may also weaken absorptive capacity, as it leads to less knowledge accumulation within the contracting firm (Fey & Birkinshaw, 2005; Weigelt, 2009).

Different sectors differ with respect to overall R&D intensity; the share of turnover, which can be spent on R&D and the share of R&D, which can be contracted out. This cannot be fully captured by the sector controls. The dummy variable RDINV thus takes on the value one if the R&D intensity of the firm is above the median for innovation active firms in the subsector group. Similarly, the dummy variable RDEXINV takes on the value 1 if the share of total R&D contracted out is above the subsector median for innovation active firms.

The networks of foreign enterprise groups may serve as a channel for collaboration partner search (Asheim, et al., 2012; Hansen, 1999) in a wider range of business contexts than individual firms can cover (Björkman, Barner-Rasmussen, & Li, 2004; Currah & Wrigley, 2004; Ebersberger & Herstad, 2011a; Ebersberger, Lehtoranta, et al., 2011; Ivarsson, 2002; G. Szulanski, 1996). Yet, such affiliation also requires attention (Forsgren, 1996; Ocasio, 1997), potentially at the expense of attention towards collaborative knowledge development (Asheim, et al., 2012; Asheim & Herstad, 2005; Blanc & Sierra, 1999; Gulbrandsen & Godoe, 2008; Phelps & Fuller, 2000). The variable FOREIGN is included to capture this effect. Public innovation funding schemes often aim to achieve behavioral additionally (Clarysse, Wright, & Mustar, 2009; Czarnitzki, Ebersberger, & Fier, 2007; Falk, 2007). The variable PUBFIN capture receipt of such funding from either one of five specified domestic or EU public sources. Last, as collaborative work involve exposure of proprietary knowledge (Ebersberger, Herstad, et al., 2011), the willingness to engage can be assumed contingent on formal IPR protection (e.g. Iversen, 2011). PROPAT captures whether the firm has used patents to protect proprietary knowledge.

Results

Table 3 below show the results of the regressions on overall involvement (Model 3) and supply versus demand side involvement (Model 4). In accordance with expectations we find that overall involvement increases with high R&D intensity, patenting and the breadth of market presence. A highly significant positive impact is also detected from public funding, while no significant impacts are associated with foreign group affiliation or any of the size groups. This is notable; because it means that the actual involvement of the establishment is decoupled from organizational characteristics, which should be conducive to such. By contrast, the impact from location in the capital region labor market on overall involvement is positive and highly significant, while the impact from location in the second largest city of Bergen is significantly negative. Notable is also how the strong average involvement scores of KIBS in Trondheim (Table 2) are attributable to individual firm characteristics, not to contextual effects.

By disentangling supply and demand side involvement we can more clearly see the different mechanisms at play. In accordance with theoretical expectations, the positive impact from high R&D intensity remains on the supply side, but disappears on the demand side. Demand side involvement is driven by the breadth of market presence, patenting and public funding, and not influenced by establishment size or foreign group affiliation. Yet, it is significantly lower in the second and third largest cities of Norway. This suggests that the more diverse demand base of these large cities is reducing the need of KIBS within them to engage in geographically broad demand side collaboration, compared to firms in rural locations. Apparently contradictory to this we find KIBS in the inner city of Oslo to be significantly more involved on the demand side, than firms on rural locations. This indicate that the diversity of internationalized industrial, academic and government functions present in the capital region broadens search and mediate information asymmetries involved in transactions with

knowledge (Arrow, 1962; Lundvall & Johnson, 1994) on both supply and demand sides, thus supporting collaboration at those spatial scale most sensitive to the pre-existing search space of the independent service providing establishment.

Table 3 approximately here

Conclusion

This paper has contributed to the literature on knowledge-intensive services and internationalization along three main lines. First, it has argued that the impact of location on the innovation activity and behavior of knowledge-intensive business services can be expected to be dependent not only on the nature of the location itself, but also on the independence of the service providing establishment. Second, it has suggested that demand and supply side international collaboration are distinct from each other and should be considered subjected to different centrifugal and centripetal forces. Based on these recognitions, it has, third, shown empirically that it is location in the capital region which is associated with positive contextual impacts on involvement. Knowledge-intensive business services located within this region are truly linking advanced client demand to sources of knowledge residing outside their prior and existing demand base. Yet, this cannot be attributed to contextual conditions offered by urban economies in general as the contextual impacts found for other large Norwegian cities are, if significant, negative. This is consistent with other studies, which have pointed to the unique characteristics of the capital region KIBS base (e.g. Wood, 2006).

The analysis has notable limitations, which reflect characteristics of the data used. First, our dependent variables do not capture the geographical reach (e.g. de Jong & Freel, 2009; Laursen, et al., 2011) or diversity, at the individual country level, of collaboration. Second, we only capture the existence of a collaborative linkage towards a certain partner group, independent of its intensity and the number of actual partners involved. In other words, we cannot e.g. distinguish KIBS that are involved with many, potentially diverse, clients at a certain geographical scale, from those involved with only a limited number.

Last, the propensity to collaborate is deeply interwoven with the institutions, industrial development paths and policy legacies which combined define national innovation systems (Dachs, et al., 2008; Ebersberger, Herstad, et al., 2011; Narula, 2002). This means that findings from a single, highly specialized small economy cannot at the outset be assumed to be valid in different other national contexts. Still, our findings clearly suggest that the internationalization of business services cannot be understood merely within the context of market access and service provision. Knowledge intensive business services firms engage in international innovation collaboration irrespective of such and these linkages may under certain circumstances be conditioned by the locations in which they reside. Consequently, the further study of KIBS internationalization patterns on a broader basis than merely within the context of demand pull is not only a possible venture, but also a necessary one.

References

- Achs, Z. J., & Audretsch, D. B. (1988). Innovation in large and small firms. *American Economic Review*, 78, 678–690.
- Adams, J. D. (2002). Comparative localization of academic and industrial spillovers. *Journal of Economic Geography*, 2, 253-278.
- Agarwal, R., Echambadi, R., Franco, A. M., & Sarkar, M. B. (2004). Knowledge transfer through inheritance: Spin-out generation, development and survival. *Academy of Management Journal*, 47(4), 501-522.
- Agrawal, A., Cockburn, I., & McHale, J. (2006). Gone but not forgotten: knowledge flows, labor mobility, and enduring social relationships. *Journal of Economic Geography*, 6(5), 571-591.
- Alvesson, M. (2000). Social identity and the problem of loyalty in knowledge-intensive companies. *Journal of Management Studies*, 37, 1101-1123.
- Alvesson, M., & Kärreman, D. (2007). Unraveling HRM: Identity, Ceremony, and Control in a Management Consulting Firm. *Organization Science*, 18(4), 711-723.
- Anselin, L., Varga, A., & Acs, Z. (1997). Local geographic spillovers between university research and high technology innovations. *Journal of Urban Economics*, 42, 422-448.
- Arranz, N., & de Arroyabe, J. C. F. (2007). Governance structures in R&D networks: An analysis in the European context. *Technological Forecasting and Social Change*, 74(5), 645-662.
- Arrow, K. J. (1962). The Economic Implications of Learning by Doing. *The Review of Economic Studies Ltd.*, 29(3), 155-173.
- Asheim, B. T. (1996). Industrial districts as 'learning regions': a condition for prosperity. *European Planning Studies*, 4, 379-400.
- Asheim, B. T. (1999). Interactive learning and localised knowledge in globalising learning economies. *GeoJournal*, 49, 345-352.
- Asheim, B. T., Ebersberger, B., & Herstad, S. (2012). MNCs between the global and the local: Knowledge bases, proximity and globally distributed knowledge networks. In M. Heidenreich (Ed.), *Innovation and Institutional Embeddedness of Multinational Companies*. Cheltenham: Edward Elgar (in print).
- Asheim, B. T., & Herstad, S. (2005). Regional innovation systems, varieties of capitalisms and non-local relations: Challenges from the globalising economy. In R. A. Boschma & R. C. Kloosterman (Eds.), *Learning from Clusters: A critical Assessment for an Economic-Geographical Perspective*. Dordrecht: Springer.
- Aslesen, H. W., & Isaksen, A. (2007a). Knowledge intensive business services and urban industrial development. *Service Industries Journal*, 27(3), 321-338.
- Aslesen, H. W., & Isaksen, A. (2007b). New perspectives on knowledge-intensive services and innovation. *Geografiska Annaler Series B-Human Geography*, 89B, 45-58.
- Aslesen, H. W., Isaksen, A., & Stambøl, L. S. (2008). Knowledge intensive business services as innovation agent through client interaction and labour mobility. *International Journal of Services Technology and Management*, 9(2), 138-153.
- Aslesen, H. W., & Jakobsen, S. E. (2007). The role proximity and knowledge interaction between head offices and KIBS. *Tijdschrift voor Economische en Sociale Geografie*, 98(2), 188-201.
- Balsvik, R. (2011). Is labor mobility a channel for spillovers from multinationals? Evidence from Norwegian manufacturing. *Review of Economics and Statistics* 93(1), 285-297.
- Bathelt, H., Malmberg, A., & Maskell, P. (2004). Clusters and Knowledge: Local Buzz, Global Pipelines and the Process of Knowledge Creation. *Progress in Human Geography*, 28(1), 31-56.
- Benito, G. R. G., Larimo, J., Narula, R., & Pedersen, T. (2002). Multinational enterprises from small economies: Internationalization patterns of large companies from Denmark, Finland and Norway. *International Studies of Management and Organization*, 32(1), 57-78.
- Bennett, R., Robson, P., & Bratton, W. (2001). The influence of location on the use by SMEs of external advice and collaboration. *Urban Studies*, 38(9), 1531-1557.

- Bettencourt, L. A., Ostrom, A. L., Brown, S. W., & Roundtree, R. I. (2002). Client co-production in knowledge intensive business services. *California Management Review*, 44, 100-128.
- Bhattacharya, M., & Bloch, H. (2004). Determinants of innovation. *Small Business Economics*, 22, 155-162.
- Björkman, I., Barner-Rasmussen, W., & Li, L. (2004). Managing knowledge transfer in MNCs: The impact of headquarter control mechanisms. *Journal of International Business Studies*, 35, 443-455.
- Blanc, H., & Sierra, C. (1999). The internationalisation of R&D by multinationals: A trade-off between external and internal proximity. *Cambridge Journal of Economics*, 23, 187-206.
- Boschma, R. (2005). Proximity and Innovation: A Critical Assessment. *Regional Studies*, 39(1), 61-74.
- Bottazzi, L., & Peri, G. (2003). Innovation and spillovers in regions: Evidence from European patent data. *European Economic Review*, 47(687-710).
- Bozeman, B., & Gaughan, M. (2011). How do men and women differ in research collaborations? An analysis of the collaborative motives and strategies of academic researchers. *Research Policy*, doi:10.1016/j.respol.2011.07.002.
- Breschi, S., & Lenzi, C. (2010). Spatial patterns of inventors' mobility: Evidence on US urban areas. *Papers in Regional Science*, 89(2), 235-250.
- Bryson, J. R. (2001). Services and internationalisation: Annual report on the progress of research into service activities in Europe in 1998. *Service Industries Journal*, 21(1), 227-240.
- Cantwell, J., & Mudambi, R. (2005). MNE Competence-Creating Subsidiary Mandates. *Strategic Management Journal*, 26(12), 1109-1128.
- Casson, M. (1997). *Information and organization: A new perspective on the theory of the firm*. Oxford: Oxford University Press.
- Castellacci, F. (2010). The internationalization of firms in the service industries: Channels, determinants and sectoral patterns. *Technological Forecasting and Social Change*, 77(3), 500-513.
- Clark, T., & Rajaratnam, D. (1999). International services: perspectives at century's end. *Journal of Services Marketing*, 13(4-5), 298-310.
- Clark, T., Rajaratnam, D., & Smith, T. (1996). Toward a theory of international services: Marketing intangibles in a world of nations. *Journal of International Marketing*, 4(2), 9-28.
- Clarysse, B., Wright, M., & Mustar, P. (2009). Behavioural additionality of R&D subsidies: A learning perspective. *Research Policy*, 38(10), 1517-1533.
- Coe, N. M., Dicken, P., & Hess, M. (2008). Global production networks: Realizing the potential. *Journal of Economic Geography*, 8, 271-295.
- Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: The two faces of R&D. *Economic Journal*, 99(397), 569-596.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity - a new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152.
- Coviello, N. E., & Munro, H. J. (1995). Growing the entrepreneurial firm. *European Journal of Marketing*, 29(7), 49-61.
- Crepon, B., Duguet, E., & Mairesse, J. (1998). Research, innovation, and productivity: An econometric analysis at the firm level. *Economics of Innovation and New Technology*, 7, 115-158.
- Currah, A., & Wrigley, N. (2004). Networks of organizational learning and adaption in retail TNCs. *Global Networks*, 4(1), 1-23.
- Czarnitzki, D., Ebersberger, B., & Fier, A. (2007). The relationship between R&D collaboration, subsidies and R&D performance: Empirical evidence from Finland and Germany. *Journal of Applied Econometrics*, 22, 1347-1366.
- Dachs, B., Ebersberger, B., & Pyka, A. (2008). Why do firms cooperate for innovation? A comparison of Austrian and Finnish CIS3 results. *International Journal of Foresight and Innovation Policy*, 4(3/4), 200-229.
- Dahl, M. S., & Pedersen, C. O. R. (2004). Knowledge flows through informal contacts in industrial clusters: myth or reality? *Research Policy*, 33(10), 1673-1686.

- Dankbaar, B. (2003). Towards a new paradigm? Innovation management in knowledge intensive services. . In B. Dankbaar (Ed.), *Innovation and knowledge management* (pp. 343-362). London: Imperial College Press.
- de Jong, J. P. J., & Freel, M. (2009). Absorptive capacity and the reach of collaboration in high technology small firms. *Research Policy*, 39(1), 47-54.
- DeSarbo, W. S., Di Benedetto, C. A., & Song, M. (2007). A heterogenous resource based view for exploring relationships between firm performance and capabilities. *Journal of Modelling in Management*, 2(2), 103-130.
- Dougherty, D. (1992). A practice-centered model of organizational renewal through product innovation. *Strategic Management Journal*, 13, 77-92.
- Dougherty, D. (2004). Organizing practices in services: Capturing practice-based knowledge for innovation. *Strategic Organization*, 2(1), 35-64.
- Doz, Y., Wilson, K., & Veldhoen, S. (2006). Innovation: Is global the way forward? *Booz Allen Hamilton & INSEAD*.
- Drejer, I., & Vinding, A. (2007). Searching near and far: Determinants of innovative firms propensity to collaborate across geographical distance. *Industry and Innovation*, 14(259-275).
- Dunning, J. H. (1998). Location and the multinational enterprise. *Journal of International Business Studies*, 29(1), 45-66.
- Ebersberger, B., & Herstad, S. (2011a). Go abroad or have strangers visit? On organizational search spaces and local linkages. *Journal of Economic Geography*, doi: 10.1093/jeg/lbq057
- Ebersberger, B., & Herstad, S. (2011b). Product innovation and the complementarities of external interfaces. *European Management Review*, 8(3), 117-135.
- Ebersberger, B., & Herstad, S. (2011c). Product innovation and the complementarities of external interfaces. *European Management Review*, DOI: 10.1111/j.1740-4762.2011.01014.x.
- Ebersberger, B., Herstad, S., Iversen, E., Som, O., & Kirner, E. (2011). *Open innovation in Europe*. Brussels: European Commission, DG Enterprise and Industry.
- Ebersberger, B., Lehtoranta, O., & Herstad, S. (2011). Bridging the global and the local? Multinational enterprises, labor market mobility and localized learning. *Paper to be presented at 56th Annual ICSB World Conference, Stockholm June 15th - 18th 2011*.
- Ebersberger, B., Marsili, O., Reichstein, T., & Salter, A. (2010). Into thin air - using a quantile regression approach to explore the relationship between R&D and innovation. *Journal of Applied Economics*, 24(1), 95-102.
- Edquist, C. (1997). *Systems of innovation : technologies, institutions and organizations*. London: Pinter.
- Eriksson, R., Lindgren, U., & Malmberg, G. (2008). Agglomeration mobility: effects of localisation, urbanisation, and scale on job changes. *Environment and Planning A*, 40(10), 2419-2434.
- Eurostat. (2010). Community innovation survey - Reference Metadata in Euro SDMX Metadata Structure (ESMS). http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/inn_esms.htm (last accessed 17 Aug 2010, 18:00)
- Evangelista, R. (2000). Sectoral patterns of technological change in services. *Economics of Innovation and New Technology*, 9, 183-221.
- Falk, R. (2007). Measuring the effects of public support schemes on firms' innovation activities - Survey evidence from Austria. *Research Policy*, 36(5), 665-679.
- Faulconbridge, J. R. (2007). Exploring the role of professional associations in collective learning in London and New York's advertising and law professional-service-firm clusters. *Environment and Planning A*, 39, 965 - 984.
- Feldman, M. (2000). Location and innovation: the new economic geography of innovation, spillovers, and agglomeration. In G. Clark, M. Feldman & M. Gertler (Eds.), *The Oxford Handbook of Economic Geography*. Oxford: Oxford University Press.
- Fernhaber, S. A., Gilbert, B. A., & McDougall, P. P. (2008). International entrepreneurship and geographic location: An empirical examination of new venture internationalization. *Journal of International Business Studies*, 39, 267-290.

- Fey, C. F., & Birkinshaw, J. (2005). External sources of knowledge, governance mode and R&D performance. *Journal of Management* 31(4), 597-621.
- Fischer, M. M., Revilla Diez, J., & Snickars, F. (2000). *Metropolitan innovation systems*. Heidelberg: Springer.
- Forsgren, M. (1996). The advantage paradox of the multinational corporation. In I. Björkman & M. Forsgren (Eds.), *The Nature of the International Firm* (pp. 69-85). Copenhagen: Copenhagen Business School Press.
- Foyn, F., Gundersen, F., Gunnes, H., Langhoff, K., Nås, S. O., Onsager, K., et al. (2011). Regionale sammenligninger av FoU og innovasjon (Regional comparisons of R&D and innovation). In K. Wendt (Ed.), *Det norske forskningssystemet 2011 (Science and technology indicators for Norway 2011)*. Oslo: The Research Council of Norway.
- Freel, M. (2006). Patterns of technological innovation in knowledge-intensive business services. *Industry and Innovation*, 13(3), 335-358.
- Frenken, K., Oort, F. V., & Verburg, T. (2007). Related Variety, Unrelated Variety and Regional Economic Growth. *Regional Studies*, 41(5), 685-697.
- Frenz, M., Girardone, C., & Ietto-Gillies, G. (2005). Multinationality matters in innovation: The case of the UK financial services. *Industry & Innovation*, 12(1), 65-92.
- Frenz, M., & Ietto-Gillies, G. (2007). Does multinationality affect the propensity to innovate? An analysis of the Third Community Innovation Survey *International Review of Applied Economics*, 21(1), 99-117.
- Fritsch, M., & Franke, G. (2004). Innovation, regional knowledge spillovers and R&D cooperation. *Research Policy*, 33(2), 245-255.
- Gallouj, F. (2002). Innovation in services and the attendant old and new myths. *Journal of Socio-Economics*, 31, 137-154.
- Gallouj, F., & Weinstein, O. (1997). Innovation in services. *Research Policy*, 26, 537-556.
- Gaugan, M., & Corley, E. (2010). Science faculty at US research universities: The impacts of university research center-affiliation and gender on industrial activities. *Technovation*, 30(3), 215-222.
- Gereffi, G., Humphrey, J., & Sturgeon, T. J. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1), 78 - 104.
- Gilbert, B. A., McDougall, P. P., & Audretsch, D. B. (2006). New venture growth: A review and extension. *Journal of Management*, 32(6), 926-950.
- Giuliani, E., & Bell, M. (2005). The micro-determinants of meso-level learning and innovation: evidence from a Chilean wine cluster. *Research Policy*, 34, 47-68.
- Glaeser, E., Kallal, H., Scheinkman, J., & Shleifer, A. (1992). Growth in Cities. *Journal of Political Economy*, 100(6), 1126-1152.
- Graf, H. (2010). Gatekeepers in regional networks of innovators. *Camb. J. Econ.*
- Grimpe, C., & Kaiser, U. (2010). Balancing internal and external knowledge acquisition: The gains and pains from R&D outsourcing. *Journal of Management Studies*, in press.
- Gulbrandsen, M., & Godoe, H. (2008). We really don't want to move, but...: identity and strategy in the internationalisation of industrial R&D. *Journal of Technology Transfer*, 33(379-392).
- Gupta, A. K., & Govindarajan, V. (2000). Knowledge flows within multinational corporations. *Strategic Management Journal*, 21, 473-496.
- Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organizational subunits. *Administrative Science Quarterly*, 44(1), 82-111.
- Hargadon, A., & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly*, 42(4), pp.716-749.
- Harris, R. I. D., & Li, Q. C. (2005). Establishment Level Empirical Study Of Links Between Exporting, Innovation, and Productivity. Report to UKTI. <http://www.ukti.gov.uk/uktihome/aboutukti/localisation/108529.html>

- Hauknes, J., & Knell, M. (2009). Embodied knowledge and sectoral linkages: An input-output approach to the interaction of high- and low-tech industries. *Research Policy*, 38(3), 459-469.
- Henderson, J. V. (2007). Understanding knowledge spillovers. *Regional Science and Urban Economics*, 37, 497-508.
- Henry, N., & Pinch, S. (2000). Spatialising knowledge: placing the knowledge community of Motor Sport Valley. *Geoforum*, 31, 191-208.
- Herstad, S., Bloch, C., Ebersberger, B., & van De Velde, E. (2010). National innovation policy and global open innovation: Exploring trade-offs, balances and complementarities. *Science and Public Policy*, 37(2), 113-124.
- Herstad, S., Paalshaugen, Ö., & Ebersberger, B. (2011). Innovation collaboration in a capital region context. *Journal of the Knowledge Economy*, 2, 507-532.
- Ivarsson, I. (2002). Transnational corporations and the geographical transfer of localised technology: a multi-industry study of foreign affiliates in Sweden. *Journal of Economic Geography*, 2(2), 221-247.
- Iversen, E. (2011). *Sources of Inventive Activity and the IPR System: An Empirical Analysis of a Changing Relationship in a Small Open Economy (Norway)*. Hobart: Faculty of Business (AIRC), University of Tasmania. Doctor of Philosophy: 201.
- Jakobsen, S.-E., & Onsager, K. (2005). Head Office Location: Agglomeration, clusters of flow nodes? *Urban Studies*, 42(9), 1517-1535.
- Javalgi, R., Griffith, D., & White, S. (2004). An empirical examination of factors influencing the internationalization of service firms. *The Journal of Services Marketing*, 17(2), 185-201.
- Jukvam, D. (2002). *Defining labour market regions*. Oslo: Norwegian Institute for Urban and Regional Research.
- Karagozoglu, N., & Lindell, M. (1998). Internationalization of small and medium-sized technology based firms: An exploratory study. *Journal of Small Business Management*, 36(1), 4-60.
- Keeble, D., & Nachum, L. (2002). Why do business service firms cluster? Small consultancies, clustering and decentralization in London and southern England. *Transactions of the Institute of British Geographers*, 27(1), 67-90.
- Klepper, S. (2001). Employee Startups in High-Tech industries. *Industrial and Corporate Change*, 10(3), 639-674.
- Knight, G. A., & Cavusgil, S. T. (2004). Innovation, organizational capabilities, and the born-global firm. *Journal of international Business Studies*, 35(4), 334-334.
- Krugman, P. (1991). *Geography and Trade*. Cambridge, MA: MIT Press.
- Lam, A. (2000). Tacit knowledge, organizational learning and innovation: A societal perspective. *Organization Studies*, 21(3), 487-513.
- Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, 19(5), 461-477.
- Laursen, K., Reichstein, T., & Salter, A. (2011). Exploring the Effect of Geographical Proximity and University Quality on University-Industry Collaboration in the United Kingdom. *Regional Studies*, 45(4), 507-523.
- Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, 24, 131-150.
- Lazarcic, N., Longhi, C., & Thomas, C. (2008). Gatekeepers of knowledge versus platforms of knowledge: From potential to realized absorptive capacity. *Regional Studies*, 42(6), 837-852.
- Lundvall, B. Å., & Johnson, B. (1994). Learning Economies. *Journal of Industrial Studies*, 1(2), 23-42.
- Løwendahl, B. R. (2000). *Strategic management of professional service firms* (2 ed.). Copenhagen: Copenhagen Business School Press.
- Maskell, P., Pedersen, T., Petersen, B., & Dick-Nielsen, J. (2007). Learning Paths to Offshore Outsourcing: From Cost Reduction to Knowledge Seeking. *Industry and Innovation*, 14(3), 239-257.
- Miozzo, M., & Soete, L. (2001). Internationalisation of services: A technological perspective. *Technological Forecasting and Social Change*, 67(2-3), 159-185.

- Nachum, N., & Keeble, D. (2003). Neo-Marshallian clusters and global networks - The linkages of media firms in Central London. *Long Range Planning*, 36(5), 459-480.
- Narula, R. (2002). Innovation systems and 'inertia' in R&D location: Norwegian firms and the role of systemic lock-in. *Research Policy*, 31(5), 795-816.
- Nooteboom, B., Van Haverbeke, W., Duysters, G., Gilising, V., & van den Oord, A. (2007). Optimal cognitive distance and absorptive capacity. *Research Policy*, 36(7), 1016-1034.
- O'Farrell, P. N., Hitchens, D. M., & Moffat, L. A. R. (1993). The competitiveness of business services and regional development: Evidence from Scotland and the South East of England. *Urban Studies*, 30(1), 629-652.
- O'Farrell, P. N., Zheng, J., & Wood, P. A. (1996). Internationalization of Business Services: An Interregional Analysis. *Regional Studies*, 30(2), 101 - 118.
- Ocasio, W. (1997). Towards an attention-based view of the firm. *Strategic Management Journal*, 18, 187-206.
- OECD. (2005). *Oslo Manual: Guidelines for collecting and interpreting innovation data*. Paris: OECD & Eurostat.
- OECD. (2008). *Open innovation in global networks*. Paris: Organisation for economic co-operation and development.
- Oettl, A., & Agrawal, A. (2008). International Labor Mobility and Knowledge Flow Externalities. *Journal of international Business Studies*, 39(8), 1242-1260.
- Owen-Smith, J., & Powell, W. W. (2004). Knowledge networks as channels and conduits: The effects of spillovers in the Boston biotechnology community. *Organization Science*, 15(1), 5-21.
- Pesola, H. (2011). *Essays on the Internationalisation of Firms*. Aalto: Aalto University, Department of Economics.
- Phelps, N. A., & Fuller, C. (2000). Multinationals, Intracorporate Competition, and Regional Development*. *Economic Geography*, 76(3), 224-243.
- Porter, M. (1990). *The Competitive Advantage of Nations*. New York: The Free Press.
- Raco, M. (1999). Competition, collaboration and the new industrial districts: Examining the institutional turn in local economic development. *Urban Studies*, 36(5-6), 951-968.
- Rammer, C., Czarnitzki, D., & Spielkamp, A. (2009). Innovation success of non-R&D-performers: substituting technology by management in SMEs. *Small Business Economics*, 33(1), 35-58.
- Robertson, M., Scarbrough, H., & Swan, J. (2003). Knowledge creation in professional service firms: Institutional effects. *Organization Studies*, 24(6), 831-857.
- Romer, P. M. (1990). Endogenous Technological Change. *The Journal of Political Economy*, 98(5, Part 2), 71-102.
- Rosenkopf, L., & Almeida, P. (2003). Overcoming local search through alliances and mobility. *Management Science*, 49(6), 751-766.
- Rosenkopf, L., & Nerkar, A. (2001). Beyond local search: Boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal*, 22(4), 287-306.
- Samiee, S. (1999). The internationalization of services: trends, obstacles and issues. *The Journal of Services Marketing*, 13(4-5), 319-336.
- Simmie, J. (2003). Innovation and urban regions as national and international nodes for the transfer and sharing of knowledge. *Regional Studies*, 37(6-7), 607-620.
- Simmie, J. (2004). Innovation and clustering in the globalised international economy. *Urban Studies*, 41(5-6), 1095-1112.
- Skjølvsvik, T., Løwendahl, B. R., Kvålshaugen, R., & Fosstenlökken, S. M. (2007). Choosing to learn and learning to choose: Strategies of client co-production and knowledge development. *California Management Review*, 49(3), 110-128.
- Sofka, W., & Grimpe, C. (2010). Specialized search and innovation performance - evidence across Europe. *R & D Management*, 40(3), 310-323.
- Stambøl, L. S. (2005). Urban and regional labour market mobility in Norway. *Statistics Norway Social and Economic Studies*(110).

- Sturgeon, T. J. (2003). What really goes on in Silicon Valley? Spatial Clustering and dispersal in modular production networks. *Journal of Economic Geography*, 3, 199-225.
- Sturgeon, T. J., Van Biesebroeck, J., & Gereffi, G. (2008). Value chains, networks and clusters: Reframing the global automotive industry. *Journal of Economic Geography*, 8, 297-321.
- Sundbo, J., & Gallouj, F. (2000). Innovation as a loosely coupled system in services. In S. Metcalfe & I. Miles (Eds.), *Innovation systems in the service economy: Measurement and case study analysis*. London: Kluwer Academic Publishers.
- Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, 17, 27-43.
- Szulanski, G. (2003). *Sticky knowledge: Barriers to knowing in the firm*: Sage Publications.
- Teece, D. J. (1988). Technological change and the nature of the firm. In G. Dosi, C. Freeman, R. Nelson, G. Silverberg & L. Soete (Eds.), *Technical Change and Economic Theory* (pp. 257-281). London: Pinter Publishers.
- Tether, B. S. (2002). Who co-operates for innovation and why? An empirical analysis. *Research Policy*, 31, 947-967.
- Tether, B. S. (2003). The sources and aims of innovation in services: Variety between and within sectors. *Economics of Innovation and New Technology*, 12(6), 481-505.
- Tether, B. S., & Hipp, C. (2002). Knowledge intensive, technical and other services: Patterns of competitiveness and innovation compared. *Technology Analysis & Strategic Management*, 14(2), 163-182.
- Tether, B. S., & Tajar, A. (2008). The organisational-cooperation mode of innovation and its prominence among European service firms. *Research Policy*, 37, 720-739.
- Todtling, F., Lehner, P., & Trippl, M. (2006). Innovation in knowledge intensive industries: The nature and geography of knowledge links. [Article]. *European Planning Studies*, 14(8), 1035-1058.
- Torre, A. (2008). On the role played by temporary geographical proximity in knowledge transmission. *Regional Studies*, 42(6), 869-889.
- Torre, A., & Rallett, A. (2005). Proximity and localization. *Regional Studies*, 39(1), 47-59.
- Unctad. (2005). World investment report 2005: , *Transnational corporations and the internationalization of R&D*. New York: United Nations.
- Verspagen, B., & Schoenmakers, W. (2000). The spatial dimension of patenting by multinational firms in Europe. *Journal of Economic Geography*, 4(1), 23-42.
- von Hippel, E. (1994). "Sticky Information" and the Locus of Problem Solving: Implications for Innovation. *Management Science*, 40(4), 429-439.
- von Nordenflycht, A. (2011). What is a professional service firm? Towards a theory and a taxonomy of knowledge-intensive firms. *Academy of Management Review*, 35(1), 155-174.
- Weigelt, C. (2009). The impact of outsourcing new technologies on integrative capabilities and performance. *Strategic Management Journal*, 30(6), 595-616.
- Wong, P. K., & He, Z. L. (2009). The impacts of knowledge interaction with manufacturing clients of knowledge-intensive business services firms. *Innovation: Management, Policy & Practice*, 11(3), 264-278.
- Wood, P. (2002). Knowledge-intensive services and urban innovativeness. *Urban Studies*, 39(5-6), 993-1002.
- Wood, P. (2006). Urban development and knowledge-intensive business services: Too many unanswered questions? *Growth and Change*, 37(3), 335-361.
- Wymbs, C. (2000). How e-commerce is transforming and internationalizing service industries. *Journal of Services Marketing*, 14(6), 463-477.
- Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization and extension. *Academy of Management Review*, 27(2), 185-203.
- Zardkoohi, A., Bierman, L., Panina, D., & Chakrabarty, S. (2011). Revisiting a proposed definition of professional service firms. *Academy of Management Review*, 36(1), 180-184.

Table 1: Establishment independence and innovation activity

	Model 1: INDEP=1		Model 2: ACTIVE=1	
	<i>Marg. Eff</i>	<i>SE</i>	<i>Marg. eff</i>	<i>SE</i>
CENTRALITY 1-4	<i>Reference</i>		<i>Reference</i>	
TRONDHEIM	-0,007	0,041	0,039	0,078
STAVANGER	-0,003	0,036	0,095	0,072
BERGEN	-0,014	0,040	0,210	0,070***
CAPITAL	0,250	0,022***	-0,233	0,104**
AGE	-0,029	0,012**	0,038	0,024
LEMP	-0,118	0,009***	0,153	0,051***
FOREIGN			-0,126	0,073*
FORMAR			0,198	0,049***
HAMPMARK			-0,227	0,099**
HAMPFIN			0,213	0,056***
HAMPKOST			0,150	0,060**
N	2359		1144	
Wald Chi2 (10)	378,67		170,37	
Prob>Chi2	0,000		0,000	
Pseudo R2	0,181		0,146	

Note: Probit regression models. Robust standard errors and marginal effects computed at the mean of the other variables. ***, ** and * indicate significance at 1 per cent, 5 per cent and 10 per cent level respectively. Five subsector controls are included in both regressions, but not reported. MILLS_INDEP, calculated on the basis of model 1, is included in model 2 but not reported. Statistics are available upon request.

Table 2: Involvement by region

	International involvement		
	INV_TOT	INV_CUST	INV_SUPPLY
TRONDHEIM	0,510	0,312	0,366
STAVANGER	0,304	0,107	0,236
BERGEN	0,098	0,034	0,097
CAPITAL	0,343	0,150	0,266
NORWAY, ALL	0,300	0,148	0,230

Note: Average involvement scores for independent and innovation active establishments.

Table 3: Involvement

	Model 3		Model 4			
	INV_TOT		[A] INV_SUPPLY		[B] INV_CUST	
	<i>Coeff.</i>	<i>SE</i>	<i>Coeff.</i>	<i>SE</i>	<i>Coeff.</i>	<i>SE</i>
CENTRALITY 1-3	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
TRONDHEIM	0,083	0,135	0,054	0,093	0,083	0,086
STAVANGER	-0,101	0,098	-0,054	0,088	-0,135	0,082*
BERGEN	-0,223	0,087**	-0,148	0,085*	-0,148	0,080*
OSLO NE	0,451	0,132***	0,355	0,149**	0,193	0,139
OSLO W	0,525	0,151***	0,487	0,111***	0,164	0,103
OSLO C	0,474	0,118***	0,426	0,093***	0,162	0,086*
InAGE	-0,042	0,033	-0,040	0,028	-0,008	0,026
SMALL	0,077	0,099	0,085	0,072	0,043	0,067
MEDIUM	<i>Reference</i>		<i>Reference</i>		<i>Reference</i>	
LARGE	-0,184	0,180	-0,169	0,148	-0,213	0,138
FOREIGN	0,055	0,120	-0,118	0,086	-0,011	0,080
RDINV	0,162	0,063**	0,111	0,053**	0,027	0,050
RDEXINV	0,019	0,086	0,029	0,063	-0,032	0,058
PROPAT	0,421	0,144***	0,257	0,083***	0,174	0,077**
MARLOC	0,091	0,059	0,073	0,051	0,050	0,048
MARBREADTH	0,409	0,137***	0,270	0,102***	0,437	0,095***
HAMPMARK	-0,040	0,082	-0,045	0,119	-0,045	0,111
PUBFIN	0,407	0,159**	0,390	0,077***	0,225	0,072***
N	671		671		671	
F/Chi2	F = 6,37		Chi2=158,69		Chi2=86,38	
Prob>F/Chi2	0,000		0,000		0,000	
R2	0,2084		0,1913		0,1141	

Note: Coefficients and standard errors from OLS regression (model 3) and seemingly unrelated regression (model 4, A-B). ***, ** and * indicate significance at 1 per cent, 5 per cent and 10 per cent level respectively. MILLS_INDEP and MILLS_ACTIVE, calculated on the basis of model1 and 2 respectively, are included but not reported. Sector controls are included but not reported. Statistics are available upon request

Table 4: Correlations

	Mean	SD	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 INV_TOT	0,300	0,740	5,551	1,000																			
2 INV_SUPP	0,230	0,592	4,260	0,902	1,000																		
3 INV_CUST	0,148	0,531	5,774	0,778	0,603	1,000																	
4 LnAGE	2,164	0,840	3,807	0,006	-0,004	0,019	1,000																
5 TRONDH	0,062	0,242	1,000	0,073	0,060	0,080	0,068	1,000															
6 STAVANG.	0,078	0,269	1,000	0,002	0,003	-0,022	-0,036	-0,075	1,000														
7 BERGEN	0,092	0,289	1,000	-0,087	-0,071	-0,068	-0,036	-0,082	-0,093	1,000													
8 CAPITAL NE	0,033	0,178	1,000	-0,047	-0,055	-0,029	0,071	-0,048	-0,054	-0,059	1,000												
9 CAPITAL W	0,095	0,294	1,000	0,058	0,067	0,021	-0,068	-0,084	-0,095	-0,103	-0,060	1,000											
10 CAPITAL C	0,343	0,475	1,000	0,040	0,041	0,003	-0,002	-0,186	-0,211	-0,230	-0,133	-0,234	1,000										
11 SMALL	0,734	0,442	1,000	-0,141	-0,122	-0,065	-0,081	0,017	0,017	0,091	0,088	-0,128	-0,128	1,000									
12 MEDIUM	0,237	0,426	1,000	0,110	0,097	0,063	0,048	-0,023	-0,024	-0,087	-0,087	0,131	0,101	-0,927	1,000								
13 LARGE	0,029	0,167	1,000	0,095	0,076	0,011	0,092	0,015	0,016	-0,017	-0,012	0,005	0,079	-0,285	-0,096	1,000							
14 FOREIGN	0,071	0,256	1,000	0,069	-0,003	0,023	0,090	0,014	-0,055	-0,072	-0,025	0,076	0,089	-0,245	0,180	0,190	1,000						
15 RDINV	0,510	0,500	1,000	0,166	0,155	0,098	-0,111	0,033	-0,066	-0,085	0,007	-0,036	0,072	0,136	-0,126	-0,039	-0,045	1,000					
16 RDEXINV	0,757	0,429	1,000	-0,099	-0,104	-0,058	0,017	-0,037	0,015	-0,048	0,063	-0,090	0,098	0,056	-0,047	-0,028	0,029	-0,311	1,000				
17 PROPAT	0,081	0,273	1,000	0,265	0,225	0,152	-0,055	0,104	0,127	0,008	-0,042	0,001	-0,046	-0,073	0,024	0,133	0,056	0,147	-0,081	1,000			
18 MARLOC	0,245	0,430	1,000	-0,029	-0,019	-0,002	0,094	-0,071	0,001	0,036	-0,037	-0,046	-0,145	0,086	-0,078	-0,031	-0,073	-0,082	-0,015	-0,103	1,000		
19 MARBR.	0,437	0,219	1,000	0,229	0,199	0,230	-0,027	0,020	0,143	-0,028	-0,081	0,044	0,001	-0,086	0,078	0,029	0,075	0,102	-0,020	0,153	-0,017	1,000	
20 HMARK	0,033	0,180	1,000	-0,072	-0,068	-0,052	0,040	0,075	0,003	0,013	-0,034	0,062	-0,092	-0,030	0,043	-0,032	-0,051	-0,114	-0,013	-0,055	0,002	-0,071	1,000
21 PUBFIN	0,097	0,296	1,000	0,242	0,264	0,180	-0,059	0,098	-0,061	0,036	-0,060	0,044	-0,077	-0,003	0,011	-0,020	-0,043	0,256	-0,200	0,121	-0,089	0,144	-0,050

Note: Active establishments only. The minimum value for all variables is zero.