Growth in knowledge-intensive business services: Evidence from Lombardy

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Abstract

This paper studies growth patterns of knowledge intensive businesses services (KIBS) in Lombardy on the basis of original firm-level survey data. It aims at investigating in particular the role and interplay of age and size, as well as the modes of innovation in the process of growth. Our findings indicate that, within the KIBS sector, younger firms tend to outperform incumbents in terms of sales growth. Furthermore, large firms tend to grow more than small companies. However, the effects of firm size and age vary substantially according to the firm's specific pattern of innovation. In particular, very innovative firms tend to outperform competitors regardless of their age or size, while for conservative KIBS size constitutes a prerequisite for growth. The investment in human capital and in the service distribution network also represent important competitive leverages for growing KIBS.

Keywords: KIBS, entrepreneurship, growth

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1. Introduction

Over the last decade, scholars and policy makers have dedicated increasing attention to knowledge-intensive firms, as key players enabling the conversion of new technical knowledge into commercial activities, and on young innovative companies as crucial actors in the development of more radical innovations and creators of new markets or market niches (Schneider and Veuglers, 2010). These ventures often perform a considerable role in the commercialization of new knowledge. By converting knowledge into market innovation, by introducing into an industry new competencies, new products and new processes, knowledge-intensive firms stimulate economic growth and industrial renewal.

Despite representing a relatively minor share, knowledge-intensive firms are frequently associated with faster than average growth rates (Schneider and Veuglers, 2010). Survival and growth is, in fact, crucial to sustain innovation, employment and economic expansion. On the other hand, empirical evidence shows that a great proportion of newly founded firms exit from the market in a rather short time (Geroski, 1995), and that survival and growth chances are largely differentiated in the enterprise population (e.g. Glaeser et al., 1992; Klepper, 2001). In other terms, what matters to growth is not only the entry of new entrepreneurs into markets, but also the quality, type, potential and sustainability of the entrepreneurial projects.

The evidence about firms' growth patterns and determinants is however not conclusive. Sustained growth, in fact, seems to result from a combination of factors and to represent a transitory phase in the life of an enterprise. Both firm- and industry-level factors play a non negligible role, nor innovation is always a prerequisite for firm growth, as firms can grow for a number of other reasons, including the mere utilization of market opportunities (OECD, 2010b). Growth determinants, in particular, largely differ according to a firm's size and, similarly, to its experience on the market. Overall, stochastic and idiosyncratic elements look predominant and especially for small businesses, growth seems to be of a highly erratic nature (Coad, 2007). As a consequence, this is a typical field where the reply to conceptual questions has to come from the empirical approach.

Drawing on original firm-level survey data, this paper aims at investigating growth patterns and determinants of knowledge-intensive business services (KIBS). By focusing on the service industry of an advanced European region, Lombardy, which has been characterized, over the last decades, by broad knowledge-driven tertiarisation, the paper not only contributes to the broader debate on firms growth potentials but also to widen the research perspective on service firms. Indeed, in

addressing the relationship between knowledge intensity and growth performance, most of the literature has focused on the manufacturing sector. Notwithstanding the role of KIBS in the development and diffusion of innovation, firms' characteristics and innovation profile as well as dynamics in the service sector has only recently attracted comparable attention (e.g. Koch and Stahlecker, 2006; Stahlecker and Koschatzky, 2004; Andersson and Hellerstedt, 2009), largely in relation with the evolution of local or regional innovation systems (e.g. Miles, 2005; Muller and Doloreux, 2007).

In particular, the paper focuses on the link and interplay between a firm's age, size and innovation mode, on the one hand, and growth, on the other. Despite much theoretical literature has posited the positive effect of innovation on firms growth, the empirical works have failed short of demonstrating it adequately and conclusively. In particular, the empirical tests have generally focused on the average effect of innovation for the average firm (Coad and Rao, 2008). This however neglects that, especially in sectors as KIBS, firms display a great variety of attitudes towards and of intensity of innovation (Corrocher at al., 2009) and that, despite a negligible direct effect, the link between innovation and growth can be indirect and varies according to some specific firm-level characteristics, such as a firm's age and size. This paper precisely moves from this claim and aims at shedding some lights on the more complex pathways from innovation to grow in KIBS.

The remainder of the paper is organized as follows. Section 2 provides the literature background and comments on the literature debate about KIBS and their role in the growth dynamics and transformation of innovation systems. Section 3 introduces the empirical case, providing descriptive evidence on the service sector in Lombardy and on the expansion of KIBS. Section 4 introduces our variables of interest and section 5 presents the empirical analysis, namely a logit estimation of the determinants of sales growth in KIBS. Section 6 concludes.

2. Literature background

Knowledge-intensive firms have attracted growing attention by academics and policy makers over the last decades. The interest has been stimulated by the increasing awareness of their contribution to economic development, industrial renewal, and job and wealth creation. In fact, albeit being only a small portion of firms' population, having a limited direct contribution to employment or GDP, these firms are expected to show a great potential to develop important inventions with significant commercial applications, a superior capacity to introduce more radical innovations that shape new markets, and, ultimately, to achieve faster than average growth rates (Schneider and

Veuglers, 2010). More in general, they are seen as an important mechanism for transforming knowledge output into commercial opportunities and, possibly, new markets and are considered to play an important role for the take-off of innovation and for wealth creation (Reinganum, 1983; Klepper, 1996; Henderson and Clark, 1990; Anton and Yao, 1994).

Notwithstanding this, the survival and growth rates of most (innovative) firms are relatively low. Entry is generally quite high, but a great deal of entrants is expected to fail in a rather short time; also, most of entrants are not innovative at all and limitedly contribute to the generation of new job as they experience greater exit rates (Santarelli and Vivarelli, 2007). For (new and small) firms, growth actually means survival and profit gains, but their growth patterns are largely heterogeneous and, in the end, erratic (Coad, 2007). Still, some young innovative firms may actually be able to grow faster than less innovative or incumbent firms. These are the "gazelle" type (Birch, 1987; Birch et al., 1997) or "high growth" firms that are frequently associated with innovation and organizational change. However, these companies do not necessarily derive their primary competitive advantages from innovative activities and products (Holtz-Eakin, 2000). In other terms, innovation is not always a prerequisite for firm growth, as firms can grow for a number of other reasons, including the mere utilisation of market opportunities (OECD, 2010b). Furthermore, not all fast-growing firms are necessarily new or young. Rather, empirical evidence shows that sustained growth represents a transitory phase in the life of an enterprise (OECD, 2010b; World Economic Forum, 2011); in fact, only a minority of firms is able to achieve higher than average grow rates whereas most firms grow modestly.

Although purely stochastic shocks play a non negligible role (Marsili, 2001), several systematic factors at the firm and industry levels affecting the process of firms' growth can be identified. The very vast literature on firms' growth developed around the debate on the so-called Gibrat's law allows to outline some stylized facts or empirical regularities characterizing growth processes.
As to firm level factors, the impact of size, age and innovation attracted most of attention, among the many other factors that have been associated to firms growth (Coad, 2007)[1]. Empirical results converge in suggesting that smaller firms tend to grow faster than larger firms, a result frequently indicated as 'reversion to the mean size'. Importantly, this seems to characterize only firms below a certain size threshold whereas it does not seem to be affected by sample selection bias, i.e. by the fact that smaller firms experience higher exit rates (Marsili, 2001). Being age and size closely related, an additional robust result of studies on industrial dynamics is the negative relationship

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[1] Among these additional factors one could mention the ownership structure, the entrepreneur's human capital, the degree of diversification and internationalization (Coad, 2007).

between age and growth. However, findings are not conclusive in this respect either. For instance, in the case of the US, Haltiwanger et al. (2010) find that there is no systematic relationship between firm size and growth after controlling for firm age. Also, the relationship between innovation and growth looks more complex: empirical studies failed short of demonstrating adequately and conclusively a positive relationship between the two. One possible explanation of this unexpected lack of convergent findings relates to the inherent uncertainty of innovation processes and the possible time lags needed for new knowledge to be converted in economically valuable products, in successful manufacturing and commercialization processes and in satisfactory returns. However, this is 'the average effect for the average firm'; superstar high-growth firms are able to take advantage and to profit from innovation for growing (Coad and Rao, 2009).

As to industry level factors, the possibility to exploit scale economies (Audretsch, 1995), as well as the degree of concentration and competition in the industry, have proven to be important determinants of firms growth potentials (Geroski and Toker, 1996; Geroski and Gugler, 2004).

Importantly, manufacturing (high-tech) sectors have so far attracted most of attention and empirical studies, while (knowledge-intensive) services have been relatively neglected. However, also traditional and non-manufacturing sectors can be characterized by knowledge intensity, as in many segments a rich knowledge base does exist (Smith, 2000) and the evolution of the service sector over the last couple of decades attests (Koch and Stahlecker, 2006). In particular KIBS – firms involved in activities such as consultancy, market research, design, engineering and technical services – have become prominent actors in the dynamics of the modern economies, beyond their actual direct employment relevance (Muller and Zenker, 2001; Miles, 2005; Doloreux and Muller, 2007). Tether and Hipp (2002) suggest that the tertiarization of the modern economies and the outsourcing processes concerning both routine activities and innovation tasks, drive a redistribution of knowledge in favour of KIBS and away from traditional producers and service providers. This emerging trend matches with a revival of new self-employed independent knowledge-workers (Bogenhold and Fachinger, 2008). Accordingly, in the literature, KIBS are increasingly portrayed as 'bridges of innovation' in different systems, which interact with the manufacturing sector as knowledge purchasers, providers and partners (Strambach, 1998; Czarnitzki and Spielkamp, 2000), trigger and strengthen processes of knowledge conversion in client firms (den Hertog, 2000). The role of KIBS appears to be particularly significant in advanced regions, where competitiveness depends on knowledge contents, provided by highly specialised suppliers to high and medium-tech business users.

Recent works on KIBS have discussed the role of industry-, market- and firm-specific characteristics in the performance of KIBS firms, similarly to those analysed in the more mature literature on manufacturing (Colombo et al., 2004; Colombo and Grilli, 2005). Given the intangible nature of the service activity, specific importance is attached factors such as demand characteristics, proximity with customers, knowledge spillovers, human capital and interactive learning capabilities and their impact on performance. For example, because of the close interaction with customers in the service production and delivery, demand is considered to play a key role for survival and growth. The development of KIBS' knowledge base is, in fact, intimately related to the activity they perform for their clients (Muller and Zenker, 2001), which contribute to its development and orientation. Similarly, proximity to suppliers and customers is of great importance to innovative performance, as the innovation-process itself is much client-oriented (Corrocher et al., 2009). Also, the availability of highly skilled and specialized human capital is likely to be of great relevance to knowledge-intensive service firms, because of the intangibility and knowledge content of their output (Cappellin and Wink, 2009).

The heterogeneity within KIBS and their variety of innovation patterns have been increasingly documented in the literature. Recent contributions have shown that the propensity to innovate among KIBS firms varies, and more importantly, innovation takes place in different forms. There is not a unique service pattern of innovation, but rather a variety of modes of innovation, which reflect the intrinsic heterogeneity of the sector (Tether, 2005; Corrocher et al. 2009). Overall, the diversity of KIBS activities link much to the specific nature of the business, as well as to firm-specific variables such as size and age. However, despite the increasing number of empirical studies dedicated to KIBS (see for example Di Maria et al., 2012), their growth patterns are still somehow a neglected issue.

This paper intends precisely to fill this gap by bridging the literature on growth patterns and determinants of knowledge-intensive firms, on the one hand, and the literature on KIBS, on the other. In particular, this paper aims at understanding the impact and interplay of age, size and innovation on growth in KIBS, while controlling for industry-, market- and firm-specific characteristics, such as demand type, proximity with customers, the competitive and innovative strategies adopted by new ventures. Although much evidence has been produced on these relationships, the paper enters this well documented literature by introducing two novelties.

Firstly, it focuses on a rapidly expanding and highly knowledge-intensive *service* sector. Secondly, and more interestingly, the paper claims that the lack of empirical support to the impact of innovation on growth found in several studies might be related to the neglecting of important sources of heterogeneity in attitudes towards and of intensity of innovation that characterize some specific sectors such as KIBS. Accordingly, the paper proposes that, despite a negligible direct effect and precisely because of this heterogeneity, the link between innovation and growth can be indirect and varies according to some specific firm-level characteristics, such as a firm's age and size. In other words, there is not a unique pattern of innovation that undisputedly lead to higher growth, but the relationship need to be explored in light of other context variables. The paper, therefore, moves from this claim and, firstly, provides some descriptive evidence on heterogeneity in KIBS and, secondly, provides some lights on the more complex pathways from innovation to grow in KIBS.

3. The service sector in Lombardy: some descriptive evidence

Over the last decades, Lombardy has gone through an important process of structural change, from an industry-based economy to a service-based economy. Notwithstanding its traditional orientation towards industrial activities (as emphasized in the Eurostat Regional Yearbook 2010), the region has recently experienced an increase in the number of local units and employment in the service sector in general and in KIBS in particular[2]. Between 1997 and 2007 the number of local units in these sectors has increased by 74.4 per cent in Lombardy, compared to a 61.1 per cent growth rate in Italy. The increase has been particularly remarkable (107.5 per cent over ten years) for the sector 'other business activities', which includes services such as architectural and engineering activities, advertising and market research, managing and consultancy services, legal and accounting activities. As a consequence, the relevance of Lombardy for the Italian KIBS sector has also increased, from 19.7 per cent of national units in 1997 to 21.3 per cent in 2007. In addition, regional KIBS exhibit a greater average size than national firms in the sector. Table 1 describes the relevance of KIBS sector in Lombardy as compared to the overall country, in terms of both employment and units (Lombardy share over Italy). The region hosts more than a third of Italian employment in head offices, management services and consultancy, as well as in advertising and market research. The employment in ICT related services is also above the national average,

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[2] The KIBS sector is identified with the following three NACE segments: computing services (NACE 72); research and development (NACE 73); other professional activities such, as engineering offices and consulting services (NACE 74).

whereas the region accounts for a relatively smaller share of activities in legal and accounting activities, architectural and engineering activities, technical testing and analysis, and R&D services.

Table 1 - Share of national employment and local units in Lombardy (2008)

	Employment	Local units
Computer programming, consultancy and related activities	30.7	27.4
Information service activities	24.0	21.0
Professional, scientific and technical activities	23.3	20.2
Legal and accounting activities	19.2	16.5
Activities of head offices; management consultancy activities	34.3	34
Architectural and engineering activities; technical testing and analysis	19.4	17.6
Scientific research and development	22.8	18.1
Advertising and market research	38.7	29.6
Other professional, scientific and technical activities	25.5	25.5

Source: Eurostat

The empirical investigation is based upon a stratified sample of more than 400 KIBS, which is representative of the regional universe. The stratification is based on two variables: sector (at 2-digit NACE level) and geographical location. As to the sectoral composition of the sample, sector 74 accounts for 86 per cent of the surveyed units: the main sub-sectors are "architect, engineering and technical offices" (NACE 742) accounting for 35.3 per cent of the firms in the sample, "law, market research and consulting firms" (NACE 741; 29.9 per cent), and "other activities" (NACE 748; 19.1 per cent). The second 2-digit segment (R&D services) is rather sparse (four units only in the stratified sample), as a result of the relatively low number of dedicated businesses in the regional universe.

Table 2 shows the distribution of sectors by geographical area. Across types of KIBS, more than 50 per cent of firms operate in the Milan province. This is consistent with the international evidence of KIBS concentration in large metropolitan areas. However, the Northern and Eastern part of the region are also significantly represented, as they are historically characterized by high levels of industrial activity and, nowadays, "tertiarization" trends.

Table 2 - Geographical distribution by sector and geographical area

	Milan	North	South	East	Total
Sector 72	55.2%	15.5%	10.3%	19.0%	100%
Sector 73	75.0%	0%	0%	25.0%	100%
Sector 74	54.4%	16.9%	10.8%	17.9%	100%
Total	61.5%	10.8%	7.1%	20.6%	100%

The survey was carried out in Spring 2006 by telephone interviews, and aimed at identifying the most important drivers for competitiveness and change at the individual entrepreneur and at the firm level. The questionnaire covered, among other aspects, the organization of the service

provision, key characteristics of the relevant markets and competitors, human resources education and training programmes, innovation intensity and modes, internationalization activities and strategies, investments, awareness of and access to regional policy schemes, as well as the entrepreneur's characteristics.

In the following section, we describe the variables derived from the survey most likely associated to the growth (in sales) within KIBS, according to the literature shortly reviewed in section2.

4. Growth determinants in KIBS

In this paper, growth is measured as a firm's growth in sales. In particular, firms reported the change in sales over a three-year period, the horizon that the literature typically considers to identify high growth firms (see OECD 2010b). The change was assessed on a 5 point scale, from "strong decrease" (1) to "strong increase" (5). Out of 427 KIBS firms, 71 (17%) experienced a decrease or strong decrease in sales, 283 (66%) reported stable sales, while 73 (17%) experienced an increase or strong increase in sales. For the purpose of the empirical analysis, we build the variable GROWTH, which takes value 0 if the firm has experienced a decrease/strong decrease in sales and 1 if the company's sales have been stable or if the company has experienced an increase/strong increase. We rely on two main groups of variables, usually associated with firm growth in the literature, to describe growth patterns in KIBS, namely firm-level variables on the one hand and industry- and market- level variables, on the other.

As to firm-level variables, we firstly consider two structural variables: SIZE, which is measured by the turnover level, grouped in five size classes (less than 50000 euro; 60000-250000; 280000-600000; 700000-2000000; >2000000), and AGE, a dummy variable taking value 1 if the firm is younger than 10 years and 0 otherwise. In this way, we assess whether newer and smaller knowledge intensive firms grow faster. As discussed in section 2, although small and young firms are expected to grow faster, findings in the literature are not conclusive in this regard, as there is no systematic relationship between firm size and growth after controlling for a firm's age (Haltiwanger et al., 2010).

One of the most relevant questions posed by the literature about growth performance refers to the role of innovation (Dosi, 1988; Geroski and Machin, 1992; Freel, 2000; Coad and Rao, 2007). Accordingly, we introduce an innovation dimension in the analysis. The attitude of companies

towards innovation was captured in the questionnaire through a 4 point scale assessment (from "not at all important" to "very important") of several variables characterizing innovation activities. We first reduce the number of variables relating to innovation, by means of a factor analysis, and next perform a cluster analysis on the factor loadings (see Corrocher et al., 2009). Results are reported in Tables 3 and 4. We can identify four underlying factors. The first factor, labelled 'Technology adoption', is explained by the technologies used in service production/delivery and by the use of ICT. Clearly, this group of variables characterises firms that are at the frontier in terms of adoption and use of new technologies but that are also likely to rely upon external drivers of innovation that is on specialised suppliers of tangible technological inputs. The second factor, 'Organisational change', is explained by human capital competences and organisational structure, and reflects an innovative pattern which is oriented towards changing organisational features such as the firm internal structure and personnel skills and profiles. The third factor, 'Service production', is explained by variables related to modes of service production and type of services and identifies firms that tend to develop innovations which are strongly customized and market oriented. Finally, the fourth factor, 'External Cooperation', is explained by modes of service distribution and by cooperation with customers/other firms. It captures the behaviour of firms which concentrate their innovative efforts in the "front office" and in the interaction with other firms.

Table 3 – Factors for innovation

	TECHNOLOGY ADOPTION	ORGANISATIONAL CHANGE	SERVICE PRODUCTION	EXTERNAL COOPERATION
Technologies for service production/delivery	**0,86**	0,17	0,22	0,11
Use of ICT	**0,85**	0,17	0,20	0,15
Human capital competences	0,30	**0,75**	0,08	0,16
Organisational structure	0,03	**0,73**	0,34	0,15
Modes of service production	0,30	0,16	**0,81**	0,20
Type of services	0,24	0,47	**0,64**	0,13
Modes of service distribution	0,12	0,04	0,45	**0,79**
Cooperation with customers/other firms	0,21	0,47	-0,03	**0,74**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

The factor analysis provides a basic input for the cluster analysis, which intends to illustrate the variety of attitudes towards innovation across KIBS. The purpose of this clustering exercise is to detect commonalities and differences across KIBS. The cluster membership will then be used as a covariate in the analysis. Four clusters are identified (Table 4) and statistical tests confirm that the factors are significantly different across clusters.

Table 4 – Clusters of KIBS*

	Cluster 1 (86)	Cluster 2 (109)	Cluster 3 (103)	Cluster 4 (143)
Technology adoption	-0,641	-0,790	0,024	**0,970**
Organisational change	-0,335	0,210	-0,675	**0,527**
Service production	-0,731	**0,979**	-0,576	0,109
External cooperation	**0,993**	-0,061	-1,033	0,193

* Number of firms in parentheses

Cluster 1 presents an innovative patterns focused on service delivery and cooperation, so that we label its mode of innovation as cooperative. Cluster 2 focuses on innovations related to service production (product innovation), Cluster 3 shows a very low propensity to innovate in all areas (conservative strategy), whereas Cluster 4 exhibits the most comprehensive approach to innovation, focussing on both technological innovations and organisational innovations (techno-organisational mode of innovation). Tether (2005) emphasises the need to focus on three domains in order to achieve a better conceptualisation of innovation: firms' outputs, internal organisation of firm and external organisation of service provision. Quite interestingly, our four clusters of KIBS match quite well these domains. Cluster 1 is focused on the process of external cooperation and service delivery, which reflects the importance of external relations with suppliers and customers in defining these firms' innovative patterns. Cluster 2 is characterised by an innovative strategy which puts emphasis on service production and is therefore close to the first domain of firms' outputs. Finally, cluster 4's innovative domain revolves around techno-organisational change, which identifies the internal organisation of the firms in terms of how service provision is organised.

Next, we control for a set of firm-level variables which describe the competitive strategy of the firms. The original questionnaire asked the respondents to characterise their competitive strategy, along the options listed in Table 5[3]. By way of factor analysis we reduce their number to three: DISTRIBUTION CHANNELS AND COST, INNOVATIVENESS AND COOPERATION, QUALITY AND REPUTATION. The first factor, DISTRIBUTION AND COST, captures the emphasis placed on the availability and location of distribution channels. It reflects the idea that, when competing in the market, firms pay attention to the interaction with customers in terms of both visibility and provision of post-sale services. This attention combines with price competition. The second factor, INNOVATION AND COOPERATION, characterizes firms which perceive that their competitive position

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[3] In particular, the questionnaire asked the respondents to assess on a 4 point scale (from "not at all important" to "very important") the relevance of a set of variables characterizing their competitive strategy.

depends on the technologies used, on the development of new services and on establishing partnerships with other companies in order to develop innovations. The third factor, QUALITY AND REPUTATION, is explained by competitive variables related to well-established brand reputation and quality of services, and includes also the speed of service delivery and the range of services offered. Table 5 shows (in bold) the factor loadings for the identified factors.

Finally, we also include a dummy variable related to human resources management, TRAINING, which measures the participation of the firm's personnel to training courses. In particular, this dummy variable takes value 1 if employees (often or sometimes) participate to training courses and zero otherwise. We expect firms that invest more in training and competences (i.e. on human capital) to show a stronger knowledge orientation and base and greater chances of growing.

Table 5 - Factors for competitiveness – Rotated factor loadings

Variables	DISTRIBUTION AND COST	INNOVATION AND COOPERATION	QUALITY AND REPUTATION
Competition on price and cost cutting	**0,60**	-0,25	0,40
Speed of service delivery	0,34	0,20	**0,60**
Quality of services	-0,15	0,07	**0,70**
Range of services offered	0,39	0,32	**0,43**
Localisation of distribution channels	**0,77**	0,23	-0,09
Availability of distribution channels	**0,77**	0,25	-0,08
Development of new services	0,42	**0,51**	0,27
Use of advanced technologies	0,08	**0,76**	0,23
Cooperation with other companies	0,20	**0,75**	-0,11
Reputation	-0,25	0,03	**0,58**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

As to industry- and market- level variables, we control for different dimensions of the industry and market environments, which are intended to capture the size of demand and the competitive density. We firstly consider the geographical location of the firm, by including a dummy variable – MILAN – that takes value 1 if the firm is located in Milan and 0 otherwise. We expect that areas with larger market potential provide a premium in terms of firms' growth (Mueller and Doloreux, 2007). In particular, we expect firms located in the metropolitan area of MILAN to enjoy more sustained growth and to benefit from urban positive externalities characterizing metropolitan settings. In order to capture the proximity to users or customers, we include the variable CUSTOMERS' LOCATION, which, on a 3 point scale, measures the relative distance of the main customers from the firm (from the closest, 1, to the most distant, 5). Following the literature that

emphasises the importance of demand and close user-producer interaction for KIBS (e.g. Muller and Zenker, 2001; di Maria et al., 2012), we expect firms located closer to their customers to be more likely to grow. Also, we include a dummy variable, MAIN COMPETITOR'S LOCATION, taking value 1 if the most important competitors of the firm is not located in the same urban area and 0 if it is located in the same urban area, which should capture the competitive density in the local market. We expect firms competing mostly at the local level to have a competitive advantage over other companies facing interregional or international challenges. With reference to competitors, we also consider the size of the firm's main competitor (MAIN COMPETITOR'S SIZE), which is a dummy variable taking value 1 if the firm's main competitor is smaller or of the same size as the company and 0 if it is bigger than the company. This is meant to capture the competitive pressure in the firm's market and we expect a negative correlation between the growth performance and the size of key competitors, as larger counterparts are likely to limit the profit margins of companies. Lastly, we also take into account the intensity of competition by including the variable NUMBER OF DIRECT COMPETITORS , which, on a 3 point scale, measures the number of the firm's direct competitors (up to 4 competitors, from 5 to 10 competitors, more than 10 competitors).

5. The empirical analysis: the results

In order to investigate the variables associated to growth in KIBS, we estimate a logistic model where GROWTH is our dependent variable and the covariates refer to the firm- and industry-specific variables as discussed above. Table 6 illustrates the results of the estimation with the dummy indicating growth in sales as dependent variable[4]. We report the marginal effects in order to allow for comparison across the different models; estimated coefficients are available in Annex, together with descriptive statistics on the variables. Model 1 includes all the variables described in section 4. To better describe the heterogeneity of innovation patterns and to account for the possibility that the effect of innovation modes can vary according to some specific firm-level variables such as age and size, model 2 and 3 extend the analysis by introducing the interactions between age and size and the innovation variables.

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[4] In the set of regressions proposed, coefficients are to be interpreted as a set of partial correlation indexes. That is, no causation link is assumed to run from the independent variables to the dependent ones, since they are likely to be affected by endogeneity issues. As such, the regressions are meant to add descriptive elements to the characterization of growth processes in KIBS.

Firm growth is positively associated with AGE[5]. This confirms the results from the literature: young ventures tend to grow faster than incumbents. As to SIZE, we do find evidence that larger firms tend to outperform smaller competitors, although the marginal effect is smaller than the one for AGE. Therefore, having a larger scale allows KIBS to benefit from competitive advantages. This result may need some qualification as it is not consistent with much empirical works supporting the view that smaller firms grow faster. However, there might be two possible explanations for this relatively counterintuitive result. First, our sample is mostly composed of small businesses. For small businesses, growth and survival are two coinciding goals as their life depends on the capacity to rapidly expand; however, larger firms are more likely to survive (Geroski, 1995). Therefore, this lends support to our finding that size matter for growth and survival. Second, the perception of growth disadvantages may mitigate the efforts to pursuit growth and economic expansion. Small businesses in Italy tend to be typically family-owned and family-run. This specific category has proved to be especially cautious in including extra employees from outside the family as to preserve and to keep the control of the firm and to be extremely risk adverse (Ansoff, 1987). Also, specific legislation can generate incentives not to grow and to stay informal. This is actually the Italian case (Schivardi and Torrini, 2004). In fact, a specific size threshold (i.e. 16 employees) has been identified above which firms experience increases in employment protection responsibilities. Firms may strategically act to lower this burden and decide not to grow. In our sample in fact, only a very tiny fraction of firm has more than 16 employees (i.e. only 1.36%) and almost half of them (48.53%) have one employee only.

As to firm-level control variables, firms experiencing an increase or a stability in sales are characterised by competitive strategies that rely much on the presence of distribution channels and on the (consequent) exploitation of economies of scale. To some extent, this result mirrors the effect of size: there seem to be growth opportunities for young KIBS operating with a relatively large scale and with a well developed network of distribution channels. As far as the investment in knowledge is concerned, a greater propensity to engage in training activities appears to be associated with a positive growth performance. This result confirms the importance of human capital in the performance of service companies, particularly when their activity is characterized by a high degree of knowledge intensity.

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[5] Unreported estimates, available upon request, show that the effect of age on sales growth is unchanged if we consider firms aged less than five year old.

Table 6 – Determinants of growth – Marginal effects

Dependent variable: GROWTH = 1	(1)	(2)	(3)
TRAINING[+]	0,069*	0,068*	0,063
	(0,042)	(0,042)	(0,041)
AGE[+]	0,119***		0,117***
	(0,035)		(0,035)
SIZE	0,059***	0,060***	
	(0,022)	(0,022)	
MILAN[+]	-0,050	-0,043	-0,051
	(0,036)	(0,035)	(0,035)
MAIN COMPETITOR'S LOCATION[+]	-0,067*	-0,071*	-0,065*
	(0,046)	(0,046)	(0,045)
MAIN COMPETITOR'S SIZE[+]	-0,030	-0,024	-0,033
	(0,034)	(0,033)	(0,034)
NUMBER OF DIRECT COMPETITORS	0,027	0,023	0,030
	(0,039)	(0,039)	(0,038)
MAIN CUSTOMERS' LOCATION	-0,016	-0,011	-0,021
	(0,025)	(0,025)	(0,024)
COMPETITIVENESS - INNOVATION AND COOPERATION	0,020	0,018	0,013
	(0,024)	(0,023)	(0,024)
COMPETITIVENESS - DISTRIBUTION AND COST	0,046***	0,031*	0,043***
	(0,017)	(0,017)	(0,017)
COMPETITIVENESS – QUALITY AND REPUTATION	-0,007	-0,002	-0,006
	(0,019)	(0,018)	(0,019)
EXTERNAL COOPERATION INNOVATION MODE (CLUSTER1) [+]	-0,130*		
	(0,078)		
SERVICE PRODUCTION – INNOVATION MODE (CLUSTER2) [+]	-0,073		
	(0,066)		
TECHNO-ORGANISATIONAL CHANGE INNOVATION MODE (CLUSTER4) [+]	-0,093		
	(0,061)		
AGE*CLUSTER1[+]		0,140***	
		(0,027)	
AGE*CLUSTER2[+]		0,137***	
		(0,028)	
AGE*CLUSTER3[+]		0,052	
		(0,041)	
AGE*CLUSTER4[+]		0,065*	
		(0,034)	
SIZE*CLUSTER1			0,033
			(0,026)
SIZE*CLUSTER2			0,060**
			(0,025)
SIZE*CLUSTER3			0,095***
			(0,030)
SIZE*CLUSTER4			0,068***
			(0,026)
Observations	392	392	392
Predicted Growth=1	0.86	0.87	0.86

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [+] dy/dx is for discrete change of dummy variable from 0 to 1

Turning to industry- and market-level control variables, customers' location is not associated with growth, while the characteristics of competitors play a relatively more important role. In

particular, firms with local competitors are less subject to pressure from national and international players and tend to exhibit better growth patterns. This witnesses the propensity of KIBS to successfully operate at a local level, where they can benefit from very close relationships with business customers as well as with business partners. Overall, it seems that firm-level factors matter more than industry- and market-level factors in describing growth determinants in KIBS, pointing to the largely idiosyncratic nature of growth processes (Geroski and Gugler, 2004; Marsili, 2001).

Our analysis also provides interesting insights on the relationship between the growth performance of firms and the innovative behaviour. First, model 1 shows that firm growth is not associated with specific innovation modes. Only firms relying on external cooperation mode seem to be at some disadvantage compared to firms with a conservative innovative strategy. For the other groups, there are not significant differences in growth potentials due to specific innovation mode. This seems to confirm the idea that innovation is not always a prerequisite for firm growth, as firms can grow for a number of other reasons, including the mere utilization of market opportunities (Coad, 2007; OECD, 2010b) and the exploitation of scale economies as the results on SIZE seems to suggest.

However, the pathways from innovation to growth can also be more complex and indirect and the heterogeneity in innovation mode may be not neutral in this regard. In particular, we expect that the effect of the different innovation patterns can vary across some specific firms characteristics as size and age. For this reason, in model 2 and 3 we interact the variables size and age with the 4 dummy variables each accounting for one specific innovation pattern in KIBS.

First, we notice that size has a higher marginal effect for conservative firms (i.e. firms belonging to cluster 3). On the contrary, for firms that put emphasis on innovation – being it in terms of technology/organisation or in terms of new service development or cooperation with external players – size matter less. Interestingly, size does not matter at all for firms engaging in strong cooperation with other companies and customers. In other words, relying upon an network as a strategy for implementing innovation allows firms to grow even if they are small. On the other hand, size is important for firms with innovative strategies focused on service production and technological/organisational innovations. As to age, the results are also very interesting. First, being young does not matter for growth unless some forms of propensity to innovation is in place. Second, if firms are strongly innovative – i.e. belonging to cluster 4 – age matters less for growth. This means that a high propensity to engage in technological and organisational innovations

reduces considerably the effect of age. On the contrary, being young is still an advantage for firms focusing on new service development and on external cooperation (although more for the former than for the latter).

6. Conclusions

The paper has aimed at investigating knowledge-intensive entrepreneurship in services. The analysis is based on an original firm-level survey, conducted in Lombardy, an advanced European region with a strong mid-tech manufacturing sector, which has recently undergone a broad process of tertiarisation, largely characterized by the emergence of knowledge-intensive services. In particular, the paper has investigated the patterns of growth in KIBS, with a specific focus on the variables that are traditionally considered in the literature – e.g. size, age, and innovation modes – and their interplay. In doing so, the analysis also controls for factors that refer to the competitive and market context in which firms are embedded – e.g. geographical location, competitors' location, size and number, customer proximity, as well as for some firm-level variables accounting for competitive strategy and investment in new knowledge creation.

The findings highlight that young firms tend to outperform incumbents in the KIBS sector and that size is positively associated to growth. Whereas the former result is totally in line with the literature, the latter maybe related to the fact that the pursuit of growth and survival goals are deeply intertwined for small businesses and that, at least for the Italian case, the legislative framework, on the one hand, and the prevalence of family-run businesses, on the other, may in the end distort incentives to growth. Interestingly, results suggest that no innovation mode seem to outperform the others in terms of growth pointing to the fact that growth may be the outcome of several factors (if not totally erratic and random), among which innovation does not always play the most important role.

More importantly, our results suggest that the impact of innovation on growth may not be direct; rather, innovation can indirectly affect growth. In particular, for very innovative firms, both size and age do not matter very much. This suggest that a strong orientation towards innovation mitigates the effect of these two variables. At the same time, for very conservative firms size represents a crucial factor for growth. In other words, firms without a clear innovative strategy can grow only through a large scale and by exploiting the advantages stemming from a deep knowledge and experience of the market accumulated over time. The importance of the scale of service production and distribution is reflected in the relevance of the competitive leverage based

upon the strategic location and availability of a large network of distribution channels. More in general, these results confirm further that studying growth dynamics by looking at the 'average effect for the average firm' (Coad and Rao, 2008) is not much informative if large heterogeneity characterizes not only the growth behavior, being growing firms a minority of the total population, but also, and more relevantly, the innovation behavior, as it is in the KIBS sector. Accounting for such a variety in innovation modes is extremely important to fully grasp the differentiated pathways from innovation to growth across firms and industries.

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APPENDIX

Table A1 – Variables description

GROWTH	
KIBS	Dummy variable taking value 1 if the firm belongs to the KIBS sector and 0 otherwise
AGE	Dummy variable taking value 1 if the firm is younger than 10 years and 0 otherwise
SIZE	Ordinal variable which is measured by the turnover level grouped in five size classes (less than 50000 euro; 60000-250000; 280000-600000; 700000-2000000; >2000000)
EXTERNAL COOPERATION MODE	Dummy variable taking value 1 if the firm belong to this innovation mode and 0 otherwise
SERVICE PRODUCTION MODE	Dummy variable taking value 1 if the firm belong to this innovation mode and 0 otherwise
CONSERVATIVE MODE	Dummy variable taking value 1 if the firm belong to this innovation mode and 0 otherwise
TECHNO-ORGANIZATIONAL MODE	Dummy variable taking value 1 if the firm belong to this innovation mode and 0 otherwise
COMP DISTRIBUTION AND COSTS	Factor referring to the following sources of competitiveness: availability and location of distribution channels as well as price competition
COMP INNOV AND COOP	Factor referring to the following sources of competitiveness: collaboration with other firms, use of advanced technologies and the development of new services
COMP QUALITY AND REPUT	Factor referring to the following sources of competitiveness: well-established brand reputation, quality of services, speed of service delivery and range of services offered
CUSTOMERS' PROXIMITY	Ordinal variable measuring customers' distance from the firm on a 5 point scale, from the closest to the most distant (i.e. same urban area, within 50 km, same region, Italy, abroad)
MILAN	Dummy variable taking value 1 if the firm is located in Milan and 0 otherwise
MAIN COMPETITOR'S LOCATION	Dummy variables taking value 1 if the most important competitors of the firm is not located in the same urban area and 0 if it is located in the same urban area
MAIN COMPETITOR'S SIZE	Dummy variable measuring competitors' size; it takes value 1 if the firm's main competitor is smaller or of the same size as the company and 0 if it is bigger than the company
NUMBER OF DIRECT COMPETITORS	Ordinal variables which measures on a 3 point scale the number of the firm's direct competitors (up to 4 competitors, from 5 to 10 competitors, 1more than 10 competitors)
TRAINING	Dummy variable which measures the participation of a firm's personnel to training course taking value 1 if this occurs sometimes, or regularly and 0 otherwise

Table A2 – Summary statistics

VARIABLE	N. obs	Mean	Std.Dev.	Min.	Max
GROWTH	427	1*	-	0	1
TRAINING	441	1*	-	0	1
AGE	441	0*	-	0	1
SIZE	441	2	0,94	1	5
MILAN	441	1*	-	0	1
MAIN COMPETITOR'S LOCATION	405	0*	-	0	1
MAIN COMPETITOR'S SIZE	405	1*	-	0	1
NUMBER OF DIRECT COMPETITORS	441	1*	-	0	2
MAIN CUSTOMERS' LOCATION	441	0*	-	0	2
COMPETITIVENESS - INNOVATION AND COOPERATION	441	0	0,79	-1,35	2,66
COMPETITIVENESS - DISTRIBUTION AND COST	441	0	1	-2,34	2,08
COMPETITIVENESS – QUALITY AND REPUTATION	441	0	1	-1,12	6,31
EXTERNAL COOPERATION MODE	441	0*	-	0	1
SERVICE PRODUCTION MODE	441	0*	-	0	1
CONSERVATIVE MODE	441	0*	-	0	1
TECHNO-ORGANIZATIONAL MODE	441	0*	-	0	1

*Modus value

Table A3 – Determinants of growth – Estimated coefficients

Dependent variable: GROWTH = 1	(1)	(2)	(3)
TRAINING	0.528*	0.540*	0.494*
	(0.30)	(0.31)	(0.30)
AGE	1.014***		1.009***
	(0.33)		(0.34)
SIZE	0.487***	0.508***	
	(0.19)	(0.19)	
MILAN	-0.418	-0.373	-0.431
	(0.31)	(0.30)	(0.31)
MAIN COMPETITOR'S LOCATION	-0.514	-0.561*	-0.503
	(0.33)	(0.33)	(0.33)
MAIN COMPETITOR'S SIZE	-0.249	-0.202	-0.276
	(0.28)	(0.28)	(0.28)
NUMBER OF DIRECT COMPETITORS	0.225	0.195	0.247
	(0.32)	(0.34)	(0.32)
MAIN CUSTOMERS' LOCATION	-0.135	-0.097	-0.178
	(0.20)	(0.21)	(0.20)
COMPETITIVENESS - INNOVATION AND COOPERATION	0.164	0.156	0.108
	(0.20)	(0.20)	(0.20)
COMPETITIVENESS - DISTRIBUTION AND COST	0.380***	0.267*	0.358***
	(0.14)	(0.14)	(0.14)
COMPETITIVENESS – QUALITY AND REPUTATION	-0.058	-0.017	-0.052
	(0.15)	(0.16)	(0.16)
EXTERNAL COOPERATION INNOVATION MODE (CLUSTER1)	-0.885*		
	(0.47)		
SERVICE PRODUCTION INNOVATION MODE (CLUSTER2)	-0.544		
	(0.46)		
TECHNO-ORGANISATIONAL CHANGE INNOVATION MODE (CLUSTER4)	-0.692*		
	(0.43)		
AGE*CLUSTER1		2.326**	
		(1.05)	
AGE*CLUSTER2		2.003***	
		(0.78)	
AGE*CLUSTER3		0.512	
		(0.47)	
AGE*CLUSTER4		0.651	
		(0.41)	
SIZE*CLUSTER1			0.275
			(0.22)
SIZE*CLUSTER2			0.501**
			(0.22)
SIZE*CLUSTER3			0.791***
			(0.28)
SIZE*CLUSTER4			0.570***
			(0.22)
CONSTANT	0.980	0.334	0.396
	(0.67)	(0.60)	(0.57)
Observations	392	392	392
Pseudo-R2	0.093	0.102	0.097
Log-likelihood	-162.54	-161.08	-161.91
Chi2	27.39	29.81	27.67

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$