Patterns of entrepreneurial and intrapreneurial growth driven by the fit between micro and macro environments

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Abstract
Based on entrepreneurship and intrapreneurship literatures, this paper investigates whether the fit between micro environment and macro environment of firms help to generate optimal firm growth rates in sales and employment. A cross-case analysis contrasts knowledge-intensive young entrepreneurial and established intrapreneurial firms to established conservative firms. Both entrepreneurial and intrapreneurial firms are able to grow faster than conservative firms. Consistent with previous findings, we find that entrepreneurial firms are able to exploit available opportunities in the technology and market domains to the best as empowered by their intra-organisational competences. They are followed by intrapreneurial firms that possess lower degrees of technological competences, but grow almost as high as entrepreneurial firms. We conclude that firms's high growth rates are driven by the fit that they can generate between their micro and macro environments. Conservative firms, which fail to create the fit, grow less.

Keywords. Entrepreneurship, intrapreneurship, opportunity, firm growth, institutions, cross-case analysis.

1. Introduction

Approximately half of new ventures in Europe exit the market by the end of five years of their start-up (EUROSTAT, 2015). For new ventures, growth and survival are strongly linked with each other (Wiklund, 2007) and the trajectory of growth influences new firm survival, which depends on the accumulated resources of firms (Coad et al., 2013). Having been through successive stages of the life cycle, majority of established firms have to comply with slow growth rates or decline after they reach a certain age. Some of these established firms, at a convenient time, decide to take an alternative route and extend their operations to produce products beyond the scope of their current activity in seek of higher and more dynamic growth rates. At different stages of their lives, new ventures and established ventures may show similar patterns of proactive behaviour generating high growth. Much of such sustained growth is based on dedicated and continuous creation of new knowledge and value by the organization along with favourable conditions in the external environment. Value creation and growth generation, in turn creates substantial effect on sustained employment.

Covin and Miles (1999: 48) stress on the 'entrepreneurial' philosophy that penetrates into a firm's attitudes, operations and management styles that guide the firm towards achieving higher performance over time. The 'entrepreneurial' philosophy may be realized in several different forms - i.e. in a new young firm or at times in an established old firm alike. Therefore, these may be observed as:

(i) The scaling up and forging ahead newly founded firm at the emergence stage of its life cycle
(ii) The rejuvenating and forging ahead established old organization at the revival stage of its life cycle.

The former, entrepreneurial activity as new firm formation, is explored as entrepreneurial behaviour in the extant literature. It provides elaborate evidence on the role of opportunity exploitation that leads to firm growth. It stresses risky opportunity-seeking behaviour for identification and exploitation of new and/or unexplored existing opportunities (Covin and Slevin, 1991; Shane, 2000; Ucbasaran et al, 2008). Importance of intra-organisational and micro level factors (such as human resources, innovation capability, firm competences, financial factors, etc.) have been widely discussed for their effects on entrepreneurship and opportunity-seeking behaviour (Wiklund and Shepherd, 2003a; Audretsch et al., 2008; Eckhardt and Shane, 2011).

The latter is referred to as intrapreneurial behaviour by means of creating an independent unit or set-up of a new activity for the expansion of current business and diversification through internal development. This activity involves relatively small and independent units designed to create, internally test-market and expand improved and/or innovative staff services, technologies or methods within the organization (Pinchot, 1985; Burgelman, 1983a, 1983b; Nielsen et al, 1985; Kuratko et al, 1990; Zahra, 1993; Shane, 1994; Zahra et al, 1999). This has been a hot topic in the past, but has been overlooked case from the perspective of opportunity exploration and exploitation.

Both literatures focus on the analysis of factors affecting firm performance. These factors operate at micro level, i.e. pertaining to intra-organisational aspects and at macro level, i.e. pertaining to external environment surrounding the firm. Literature most of the time deals solely with micro level factors and their effects. If both micro and macro level factors are in focus of analysis, it is usually about identifying the strengthening or indirect (moderating or mediating) effect of macro level factors on micro level factors. The concept of 'fit', on the other hand, means something else and it is different from strengthening or indirectly influencing a precondition. It is the consistency and harmony between the factors that results in the optimization of the efforts or the most optimal outcome in terms of performance (Porter, 1996).[1] It suggests an accord between micro and macro environments that can lead to most optimal performance in the organization. For instance, firms with low level of human

[1] Porter (1996) analysed fit among the activities of the firm thus bounding the concept with the firm.

resources or restricted number of innovation cooperation networks will perhaps not be able to get the most benefit from the macro environment, because they can only take in so much as it is allowed by the level of their micro foundations.[2]Yet, to sustain certain amount of growth, they will be able to select from macro level opportunities available for their level of micro factors, i.e. employing research staff not with PhDs but with undergraduate degrees only. The concept of fit provides scope for sustained growth of even established old firms, allowing them to choose from opportunities that is available to their technological level.

To the best of our knowledge, the concept of 'fit' between micro and macro environments in the entrepreneurship literature has not been investigated. But to conduct that, there is need for comparable organizational stages. For this aim, the firm life cycle approach emerges as a useful conceptual background to analyse both young entrepreneurial and established old but intrapreneurial ventures at their different life cycle stages in terms of the micro and macro environments they are embedded in. There is even room to compare them to the established old firms that are in the declining stage or just coping with very low growth rates. Thus, this research asks the overarching research question:

To what extent the fit between micro environment and macro environment determine firm performance? In other words, how do the micro level and macro level bridge themselves to create the best fit for sustained and higher rates of firm growth?

We try to answer the above question by exploring the differences between young and established firms at their different stages of life cycle. Particularly, analyzing the conditions for fit between micro and macro environments is important in the case of established old firms in order to revive industrial strategy for sustained growth.

This paper, then, aims to contribute to the existing literature by bridging the micro and macro levels and searching whether the fit between these two levels determines the rate of growth in entrepreneurial and intrapreneurial firms, brought together and compared in the same paper.

The paper is organized as follows. In the next sections, existing literatures on entrepreneurship and intrapreneurship are discussed in terms of their approach to opportunity exploitation and seizing in micro and macro environments. Section 3 describes the research methodology and informs about the cross-case research setting. Results are presented in section 4. Section 5 concludes.

[2] This is similar to the fact that a string quartet is only as good as its worst player.

2. Entrepreneurial, intrapreneurial activity and opportunities

Miller (1983) introduced firm level entrepreneurship concept and developed a measurement scale reinforcing it further. He identified innovativeness, proactiveness and risk-taking as the entrepreneurial firm's core characteristics and aptly named it 'entrepreneurial orientation'. These characteristics and the concept itself have been advanced by Covin and Slevin (1986, 1989, 1991) and further improvements and its influence on firm performance has been explored (Zahra, 1993; Dess, Lumpkin and Covin, 1997; Wennekers and Thurik, 1999; Carree and Thurik, 2003; Wiklund and Shepherd, 2003a, 2003b; Wiklund, 2007; Audretsch, 2007; Audretsch et al., 2008). Entry of new venture into a market is in itself a proactive action confronting major risks to test pioneering ideas. The same would apply to an established old enterprise if it were to break its routines and try significantly new product/process/service. An old firm would attempt proactive, risk-taking behaviour to gain competitive advantage in the market and such competence would reasonably build on its prior knowledge in the area (Zahra et al., 1999).

It is also widely agreed that generation of entrepreneurial activity is a matter of identification and exploitation of valuable opportunities. For entrepreneurial activity to take place, Shane and Venkataraman (2000) maintain that entrepreneurial opportunities must exist in the first place. They (citing Casson 1982) define them as "opportunities to bring into existence new goods, services, raw materials, and organizing methods that allow outputs to be sold at more than their cost of production". Sanders (2007) argues that opportunities are tools to present new knowledge and value creation activities. So, what factors help create entrepreneurial opportunities? For Schumpeter (1934) generation of the 'new' or 'novel' is in the core of entrepreneurial activity, which leads to entrepreneurial profit. For Eckhardt and Shane (2003) entrepreneurial opportunities manifest themselves in a variety of different forms such as location (i.e. in the product/process as change, as new raw material or in value chain), source (i.e. asymmetries in existing information or exogenous shocks of new information, demand and supply side opportunities with regard to change and differentiation between productivity-enhancing and rent-seeking behavior) or the initiator (i.e. the entrepreneurial actor). Sanders (2007) state that this activity only reaches a fruitful outcome under the coordination of an entrepreneur who brings together all the required pieces of knowledge, finance, material and human resources.

Available entrepreneurial opportunities can only be identified and grasped by firms if firms are capable enough, i.e. having the appropriate resources, competences in place when the right moment strikes. This corresponds to a time or set of circumstances that makes it possible for the firm to exploit available opportunities. Different firms possess different resources and competences (Penrose, 1995) and 'the optimal growth of the firm involves a balance between exploitation of existing resources and development of new ones.' (Wernerfelt, 1984). At individual level, entrepreneurs' discovery of opportunities are related to information that they already possess and entrepreneurial opportunities exist because different people possess different information (Kirzner, 1997) If opportunities are provided, either by market forces or by policy, firms will identify and grasp them.[3] Yet, it will be those firms, that have the resources and competences in place, to identify, exploit and alter the opportunities.

A set of circumstances appear to be just the right ones for some firms at a certain time to engage in entrepreneurial or intrapreneurial activity, whilst not for some others. Factors underlying these dynamic configurations are discussed below.

2.1 Micro-level technological opportunities

Technology generation. Technological knowledge and firm-internal characteristics can enhance the discovery and exploitation of opportunities (Wiklund and Shepherd, 2003a). A firm's competitiveness is largely determined by its R&D activities, efforts in learning and its experience, which contributes to its absorptive capacity and in turn capability development in new process, product and service creation (Nelson and Winter, 1982; Leonard-Barton, 1992; Cohen and Levinthal, 1990). Knowledge acquisition, integration and generation are for the most part a function of firm-internal resources and factors associated with these resources (Penrose, 1995) and closely related to conduct of R&D, payment for royalties, capability for design, production and innovation. Particularly R&D and patenting are important tools for fast growing firms in high technology sectors (Coad and Rao, 2008). Dynamic technological capabilities are essential elements for seizing opportunities (Teece, 2007).

Human capital relates competence building based on skills, knowledge and experience that workforce in the firm embodies. From entrepreneurship perspective, human capital is a crucial factor in opportunity identification and exploitation (Shane, 2000; Ucbasaran et al., 2008). The role of human skills championing new product ideas within the intraprenurial context is emphasized by SPRU (1972), Rothewll et al. (1974), Pinchot (1985) and Shane

[3] Evidence for this argument is the UK venture capital success in creating new firms. Based on its consistently high levels of venture capital availability (0.8 - 1.6 % of GDP during 2008 to 2014) a deliberate choice of policy tool implemented over the years, the UK has been the top country in the EU in terms of number of births of enterprises. About 9-15% of active enterprises are new entrants. The runner-ups Germany and Italy's venture capital investments are as low as 0.1-0.3% of GDP. (Source: EUROSTAT).

(1994). As the repository of intangible resources human capital is most important in new knowledge-intensive firms in emerging industries, since accessing, deploying and empowering this type of capital create opportunities for knowledge generation within intrapreneurial activities (Dess et al., 2003) and important factors for survival of new knowledge-intensive ventures beyond certain age (Malerba and McKelvey, 2016).

Networks relate to flow of knowledge among organizations. Firms transact with technology and value chain suppliers in order to access external knowledge resources to produce products/processes and services with the best possible quality at competitive prices so that they can sustain production and innovation activity for growth. These network ties serve to alleviate the extent of risk-taking that is inherent both in entrepreneurial and intrapreneurial activities (Dess et al., 2003). Establishment of such external links during the emergence stage and maintaining them throughout the firm life cycle is crucial. Informal links that are established during the emergence stage can deepen based on mutual trust in later stages. These first level informal links (i.e. social capital, see Burt, 1997; Nahapiet and Ghoshal, 1998) enable firm to access and become member of valuable networks in supply chain and help access markets. In later stages, the social capital paves the way towards more formal contractual types of links (i.e. strategic alliances, R&D agreements, etc.) in seek of both tangible and intangible sophisticated knowledge and pursuing of innovative activity (Hagedoorn, 1993; Hite 2005).

2.2.Micro-level market opportunities

Market demand affecting entrepreneurship is the concrete evidence for profitability (Kirzner, 1979; McMullen, 2011). Where there is profit, there is an opportunity for the entrepreneur driving entrepreneurial activity. Eckhardt and Shane (2003) change in consumer tastes and preferences driven by increasingly more sophisticated buyers on the demand side. Awareness, alertness and prompt action of the firm towards these changes in market are necessary to grasp the opportunities (Kirzner, 1973, 1985). Firm's access to domestic and/or foreign markets, being able to hold a share of these markets and being able to sustain this share over time particularly by increasing export capability is important for sales and profits in a competitive environment (Hobday 1994; Kirzner, 1997). Protogerou and Caloghirou (2016) observe that successful market adaptation of knowledge-intensive entrepreneurial firms is closely related to sales and employment growth rates.

Apart from real markets, opportunities are also manifested in efficient finance markets to fund entrepreneurial and intrapreneurial activity. Availability of initial finance, as an opportunity to seize, is crucial for starting new ventures. New ventures' growth is dependent on how well their capital structures are formed at the start of their life and the subsequent support by continuous funding of innovation activity throughout their life cycle (Ahlstrom and Bruton, 2006; Beck and Demirguc-Kunt, 2006; Mazzucato, 2013; Coutu, 2014).

2.3.**Institutional opportunities operating at macro-level**

Up to here, we discussed the micro-level opportunities that entrepreneurial and intrapreneurial firms can exploit in order to advance their performance. Here, we introduce the institutional opportunities at macro-level, but we specifically focus on those institutional opportunities, which have technology and market relatedness, and align with the grasped micro-level opportunities to create optimal conditions for firm performance.

Quality and effectiveness of institutional framework boost competitiveness and growth (Acemoglu et al. 2002; Rodrik et al. 2002). Institutions are regarded as 'rules of the game in a society' (North, 1990:3). They appear as formal and informal rules that determine corporate behaviour and entrepreneurial activity. Entrepreneurship literature provides well-supported evidence on the effects of institutional factors on individual entrepreneur's decisions to act assessing economic freedom, intellectual property rights and government activity (McMullen, Bagby and Palich, 2008; Autio and Acs, 2010).

There is much debate about whether institutions hinder or promote entrepreneurial activity. The issue is a complex one, research findings are ambiguous and much depends on mature versus emerging sectoral activity and national differences. Evidence from Global Entrepreneurship Monitor (GEM) data suggests it may be determined by what 'rules of the game' prevail within the borders of nations. Countries have different institutional structures thus resulting in heterogeneity in the rates of entrepreneurship (Levie and Autio, 2008). In advanced countries, institutions are well established and relatively stable, whilst in emerging markets and transition countries they are weak and constantly changing causing companies suffer the institutional voids or allowing to exploit them if they can adjust their strategies accordingly (Khanna and Palepu, 1997; Meyer and Peng, 2005; Wright et al., 2005). In that sense, institutions can equally offer incentives and constraints on entrepreneurial activity; it is up to firms whether they can adapt to institutional environment (Jackson & Deeg, 2008). Institutional entrepreneurship literature as response to traditional institutional theory argues that "… struggles still occur between different stakeholders in relation to resources and social action, and these have the capacity to recreate, even change, institutionalized practices. [Institutional entrepreneurship] seeks to initiate and enact institutional change." (Lockett et al., 2012: 357). Thus, in terms of available empirical evidence, what exactly 'institutions and institutional factors' are as regards to their effects on entrepreneurship has broad scope and whether firms have control over institutions or not is a matter of debate.

The direct role of institutions is widely investigated on new venture creation. Their effects on intrapreneurial activity have not been a major question, since there is a presumption that established firms would have already acquired the necessary information about the norms in force in the institutional environment. Although this argument may have some sound basis, it is still a challenge for the intrapreneurial firm to explore issues related to, for instance, IPR protection, public procurement of products and auditing requirements in relation to newly added product and process lines.

Literature suggests macro level factors such as IPR protection (Autio and Acs, 2010), government's procurement of advanced products (Edquist and Zabala-Iturriagagoitia, 2012), R&D tax incentives (Castellacci and Lie, 2015) are influential policy tools on firms' technology generation activities. Factors related to human skills at macro level relate to quality of the educational system as the provider of human capital and local availability of specialized research and training services, which contribute to firm's specific needs in technological issues. Macro level support to elevate the quantity and quality of suppliers, quality of research institutes and development of clusters has significant impact on firms' success. Firms can exploit these externally created opportunities if they have competences in place. Therefore, intra-organisational technological factors and technology-related institutional factors are closely related.

Ability to sense buyers' new needs is prerequisite to identify and exploit the available macro level opportunities in the market. In markets with high level of buyer sophistication, firms will need to adjust themselves to what buyers need, i.e. cheaper products or better performing but more expensive products. From a systemic approach, stimulation of demand articulation is an important function in management of innovation and entrepreneurial propensity to generate higher degrees of buyer sophistication (Smits and Kuhlmann, 2004; Radosevic and Yoruk, 2013), which may be driven by the role of lead users (Von Hippel, 1986).

In the financial markets, where firms lack their own finances, external financing through private or public loans becomes a crucial substitute (Beck and Demirguc-Kunt, 2006). The issue here mostly is about whether firms are aware of these financial opportunities or not and what effect it does have on their entrepreneurial activity and growth. Some firms will face certain barriers that prevent them from grasping the opportunities immediately (Shane and Venkataraman, 2000; Dean and McMullen, 2007). These barriers may be due to unawareness about the changing circumstances in markets as well as externally determined institutional factors that firms have no control on.

3. Methodology

An inductive and comparative multiple case studies approach is pursued for analysis of data in this study. Six cases are analysed based on the classification of entrepreneurial activity and technology types. Details about the research setting is provided in the below sections. Although not generalisable, case studies provide elaborate insights into how and why questions (Yin, 2003). They are uniquely positioned to provide new insights into theory and analysis by identifying new conceptual categories. Based on Brown and Eisenhardt (1997), each of the cases provide a series of independent experiment. By adopting Yin (2003) and Eisenhardt (1989), we use the replication and discrepancy approach to conduct the analysis to generate a conceptual framework.

3.1. Research setting for cross-case analysis

The research setting for cross-case analysis is as follows in this research. Commonalities of the selected cases are being that firms are: (1) SMEs (with less than 500 employees), (2) engaged in production activities associated directly or indirectly with low carbon technologies field and (3) located in the CEECs. The framework for comparison is arranged as in Figure 1 and is based on two dimensions: (1) type of entrepreneurial activity and (2) type of technology.

Figure 1. The setting of cross-case analysis in this research by level of technology and type of entrepreneurial activity in firms.

Type of technology \ Type of entrepreneurial activity	**Young Entrepreneurial** (Age: 5 to 10)	**Established Intrapreneurial** (Age: over 20)	**Established Conservative** (Age: over 20)
Science-based	**Case 1: ESB** Surface engineering and ceramic coatings	**Case 3: ISB** Electro-technical ceramic components and ceramic coatings	
Niche	**Case 2: EN** Electric vehicle	**Case 4: IN** Electric motors for alternative vehicles	
Conventional			**CONTROL GROUP** **Case 5: CC1** Laboratory porcelains and ceramics **Case 6: CC2** Technical ceramic parts and components

Type of activity dimension: Young entrepreneurial, established intrapreneurial and established conservative firms. This research first differentiates among the below path-breaking activities:

(1) Entrepreneurial activity, the start-up of a new firm,

(2) Intrapreneurial activity within an 'established' organization entering a new line of technology by means of creating an independent unit or set-up of a new activity for the expansion of current business and diversification through internal development, and

(3) Conservative activity of established firm that aligns with the *status quo* in producing the same products by using same process technologies over time. This represents the control group in this research.

In this research, entrepreneurial ventures are considered as young firms beyond the age of 5 but below 10. Thus, they are not brand new but *on-track* start-ups. Conservative and intrapreneurial firms are already established firms beyond the age of 20. Whilst intrapreneurial firms have taken the challenge of moving into a new and emerging technology area associated with their major technology field of production, conservative firms have been inert in taking such radical decision and cannot break their routines.

Type of technology dimension: Science-based, niche and conventional low carbon technologies. Manufacturing processes and products developed for aiming to generate the least possible greenhouse gas emissions fall into low-carbon technology category. Advanced ceramics and electric vehicles technologies today can provide feasible engineering applications to make the processes and products low-carbon. These technologies play crucial role in transition to knowledge-based, low-carbon, cost-competitive and efficient technologies and prioritized as focus sectors in many countries' technology strategy plans.

Based on kind of product and process, advanced ceramics technologies can broadly be classified into two:

(1) Conventional technology advanced ceramics[4] (e.g. powder metallurgy parts, laboratory ceramics and porcelains) identified by their structural properties[5] and by use of medium technology processes in production (e.g. wet/dry/hydraulic pressing, sintering, etc.); and by their application in medium technology sectors, such as automotive, iron and steel, standard electronics, textiles, machine tools, etc.

(2) Science-based technology advanced ceramics (e.g. electro-technical ceramics such as piezoelectrics, sensors, thin film ceramic coatings) identified by their functional properties[6] and by use of higher technology processes (e.g. injection moulding, plasma spraying, ion implantation, chemical vapour deposition,etc.) and use of R&D and by their application in high technology sectors such as telecommunications, complicated electronics, defense, aerospace, medical implants, etc.

(3) Niche technology electric vehicles and components. In energy transitions literature, more risky and novel innovations are associated with 'niche' technologies –i.e. a product designed for a small part of the technology market (Schot and Geels, 2007; 2008). Risk and uncertainty the niche innovation faces is not necessarily due to technologically complex or science-based nature of the product but it may well be due to fierce competition it faces from

[4] Conventional technology advanced ceramics are different from traditional ceramics. The latter are ordinary products such as tiles, sanitary ceramics, earthenware, etc. and are not within the scope of this research.

[5] Structural properties of a material refer to mechanical properties such as high-temperature strength, wear resistance and lightweight.

[6] Functional properties of an advanced material refer to physical, chemical, thermochemical and biological functions possessed by the material. These relate to high thermal conductivity or insulation, high electrical conductivity or resistance, high chemical stability, piezoelectricity, corrosion resistance, biocompatibility, etc.

the already established products in the market. Recognition of new products by end-users generally requires their first appearance in a local niche market where a set of arrangements are needed to protect novel technologies and to provide them with attention, legitimation and funding (Bakker, Van Lente and Engels, 2012) to allow for the co-evolution of technology, user practices, and regulatory structures (Schot and Geels, 2008). Electric, hybrid and hydrogen cars are analysed widely within this context (Andrews and DeVault, 2009; Bakker, Van Lente and Engels, 2012; Bakker, Van Lente and Meeus, 2012). Schot and Geels (2008) differentiate between the local and global niche markets stating that niche ideas usually first emerge in the local markets. Niche technologies can be captured by both new and established incumbents. Berggren et al. (2015) show that Swedish incumbents in heavy vehicles industry are perfectly able to exploit niche and markets.

3.2 Placing the research setting into life cycle model to pinpoint the stages that the cases are in

Here, we incorporate into the research setting Miller and Friesen's (1984) life cycle model as a useful tool to pinpoint each of the six cases in terms of their specific stage in their own life cycle.[7] This tool can help us to better illustrate the cross-case configuration. Miller and Friesen (1984) identified five major stages in the life cycle of a firm, i.e. birth, growth, maturity, revival and decline phases. They attribute certain characteristics to firms, such as age, sales growth rate, structure and strategic behaviour, when identifying the stage that the firm is in during its lifetime. Based on the data available to us, we can use age and sales growth rates for our cases to pinpoint the particular stage that they are in. The upper graph in Figure 2 aims to illustrate this configuration. Both entrepreneurial firms are at growth stage, since either their sales or employment growth rates are above 15%.[8] The control group of conservative firms appear to be in maturity stage with sales or employment growth rates lower than 15%, whereas the intrapreneurial firms can be placed at rejuvenation stage having achieved substantially higher growth rates than coetaneous conservative firms.

3.3 Sample and data collection

There is no category fully dedicated to advanced ceramics in ISIC or NACE industry categories. These technologies are scattered within several categories. Therefore, no existing source provides aggregate data for advanced ceramics activities. Moreover, not a list of low carbon activities in manufacturing industries is available, as opposed to green activities such as wind, photovoltaics, etc. These limitations adversely affect collection of aggregate and reliable quantitative data. The strategy in this research has been, therefore, to conduct an original survey targeting key informants in firms. Information gathered via surveys was complemented with data from Amadeus database and company websites to provide effective

[7] The life cycle model was purposefully developed to provide a dynamic analysis (over time analysis) of the firms. Although we do not conduct a dynamic analysis, since we do not investigate each case over their lifetime but at a specific point in time; we are interested in comparing firms at their different stages of life. Since, majority of firms will live through these stages, it is important to show that entrepreneurial and intrapreneurial firms bear differences from conservative firms.
[8] Miller and Friesen (1984: 1166) use 15% cut-off rate for sales growth to differentiate between growth, maturity and revival phases.

means for data triangulation to increase data reliability and validity (Miles, Huberman and Saldana, 2014).

Amadeus database holds information about firms based on NACE Rev. 2 primary codes. It is the main guide in this research, since it provides information about the main activity and main products of the firms. This allows us to reach firms that fall into the domain of this research. We first gathered primary information about the firms operating in the below sectors in Czech Republic, Hungary and Poland:

2343 - Manufacture of ceramic insulators and insulating fittings,
2344 - Manufacture of other technical ceramic products,
2561 - Treatment and coating of metals,
2910 - Manufacture of motor vehicles, and
2931 - Manufacture of electrical and electronic equipment for motor vehicles.

Table 1 illustrates the population and sample size. Using Amadeus database, we identified and contacted 52 firms operating in the above industry categories. A structured questionnaire[9] was e-mailed during November 2013 to January 2014 period to managers in three waves (i.e. two reminders) followed up by telephone calls. 7 valid questionnaire returns were obtained. This corresponds to 14% response rate. We excluded 1 firm from the control group since it exactly repeated findings from other 2 firms and would not add much to analysis. As a characteristic of case study research, our sampling was based on theoretical and empirical reasoning (Makela and Maula, 2006) and not on statistical representativeness.

Table 1. Population and sample size by technological activity.

	Population identified	Valid responds
Conventional technologies in advanced ceramics	28	3
Science-based technologies in advanced ceramics	26	2
Electric vehicles	3	1
Electric auto engines	5	1
TOTAL	**52**	**7**

Given the focus on domestic SMEs, the manager/director as key informant was targeted.[10] Reliability checks were conducted on key firm level indicators, available at Amadeus database and whenever available at firm's website, such as firm age, employment size, turnover and turnover growth rate looking for a match/mismatch with the director's answers. The correlations between the Amadeus database and data obtained from the key respondent

[9] The questionnaire is available from the author upon request.
[10] The information on managers is available in Amadeus database.

was stronger than 0.8 in all cases, suggesting that the data obtained by survey questionnaire were reliable.

3.4 Measures

Performance is measured by two indicators in this paper: Sales growth and employment growth. Employment figures have been used to assess performance in high-growth firms (Garnsey et al, 2006; Delmar and Wiklund, 2008; Eckhardt and Shane (2010). Scaling-up measure of Coutu (2014) is adopted: Either a sales or employment growth rate higher than 20 percent indicates fast growth.

Description of all measures are presented in Table 2. Measures are operationalised based on evidence from extant literature.

Table 2. Indicators used in this research and their degrees.

			Component	Indicators	low	medium	high
Outcome indicator			Firm Performance	-Sales growth rate (2007-2012 pa) -Employment growth rate (2007-2012 pa)	<5% (slow)	5-20% (medium)	>20% (fast)
Predictor Indicators	Intra-organisational (micro-level) opportunities	Technological	Technology generation	-R&D expenditures (% in turnover) (2012) -Design capability -Number of innovations (2007-2012) -Patents granted (2007-2012) -Trademarks granted (2007-2012) -ISO9001, 14001 certificates (2007-2012)	<5% Customer's design New-to-firm <1 <1 <1	5 to 10% Mostly customer's + some own design New-to-country 1 1 1	>10% Own design New-to-world >1 >1 >1
			Human skills and training	-Number of employees (with PhDs, Master's, Graduates) (2012) -R&D personnel (% in total employment) (2012) -Extent of staff training (WEF GCR Q.5.08) -Brain drain (WEF GCR Q.7.07)	<5% <5% 1,2,3 1,2,3	5-10% 5-10% 4 4	>10% >10% 5,6,7 5,6,7
			Knowledge networks and value chain	-Type of partner in research collaboration -Form of research collaboration -Value chain breadth (WEF GCR Q.11.05)	<4 partners Technical support 1,2,3	4 to 5 partners Licensing and subcontracting 4	>5 partners Research collaboration 5,6,7
		Market -related	Real market demand	-Share of exports in turnover (2012) -Foreign market demand -Domestic market demand	<10% 1,2,3 1,2,3	10-50% 4 4	>50% 5,6,7 5,6,7
			Finance market	-Source of funds: own financial sources -Source of funds: funding from a bank (WEFGCR Q.8.04)	1,2,3 1,2,3	4 4	5,6,7 5,6,7
Moderator indicators	Institutional (macro-level) opportunities	Technological	Technology generation	-Government procurement of advanced technology products (WEF GCR Q.12.05) -IPR protection (WEF GCR Q.1.02) -R&D tax incentive availability	1,2,3 1,2,3 1,2,3	4 4 4	5,6,7 5,6,7 5,6,7
			Human skills and training	-Quality of the educational system (WEF GCR Q.5.03) -Local availability of specialized research and training services (WEF GCR Q.5.07)	1,2,3 1,2,3	4 4	5,6,7 5,6,7
			Knowledge networks and value chain	-Quality of scientific research institutions (WEF GCR Q.12.02) -Local supplier quantity (WEF GCR Q.11.01) -Local supplier quality (WEF GCR Q.11.02) -State of cluster development (WEF GCR Q.11.03)	1,2,3 1,2,3 1,2,3 1,2,3	4 4 4 4	5,6,7 5,6,7 5,6,7 5,6,7
		Market-related	Real market demand	-Buyer sophistication: buyer's purchasing decision (WEF GCR Q.6.16)	1,2,3	4	5,6,7
			Finance market	-Venture capital availability (WEF GCR Q.8.05) -Source of funds: Public loan from national government or local authorities -Source of funds: Public grant from national government or local authorities -Source of funds: EU funds	1,2,3 1,2,3 1,2,3 1,2,3	4 4 4 4	5,6,7 5,6,7 5,6,7 5,6,7

3.5 Cases

Table 3 informs about cases.

Table 3. Main characteristics of the cases.

	Technology	Case	Firm code	Country	Tech field	Products	Foundation date	Number of employees (2013)
Entrepreneurial	Science-based	1	ESB	PL	Advanced ceramics	Surface engineering and ceramic coating	2004	80
	Niche	2	EN	HU	Auto	Electric vehicle	2004	12
Intrapreneurial	Science-based	3	ISB	CZ	Auto parts incl. advanced materials	Electro-technical ceramic components and ceramic coating	1996	409
	Niche	4	IN	HU	Auto parts	Electric motors for alternative vehicles	1992	14
Conservative	Conventional	5	CC1	CZ	Advanced ceramics	lab porcelain/ceramics	1995	65
		6	CC2	CZ	Advanced ceramics	technical, electrical ceramics	1994	114

Case 1 (ESB) is a Polish entrepreneurial science-based technology firm founded in 2004. Operations started directly in science-based field of technical ceramics and surface engineering. This process relies on powder/vapour deposition techniques of ceramics onto metal, glass or ceramic substrates. It provides products with anti-wear, frictionless surfaces, anti-corrosion, high thermal resistance functions desirable in the textile, automotive, defence, aircraft, machinery and cutting tools industries and bio-medical applications of hip and knee prostheses, bone joints. ESB focuses on laser cladding, laser hardening, high velocity oxy-fuel spraying and plasma spraying as process technologies.

Case 2, EN, is a Hungarian entrepreneurial niche technology firm producing diverse range of electric vehicles for use in niche markets of passenger transportation in golf courses, airports, national parks, historic quarters for tourist zones, castles, zoos, etc. Vehicle capacity of two to fourteen persons are available. Electric vehicles are classified as niche products, particularly after internal combustion engine's take over in the car industry. They are environmentally-friendly products by releasing less CO2 and by conservation of energy, since an electric

motor can convert the stored energy more efficiently into driving vehicle than an internal combustion engine and it does not consume energy whilst at rest position.

Case 3, ISB, is a Czech intrapreneurial science-based technology firm. Established in 1958 as a state-owned firm, it started operations by producing conventional components for motor vehicles industry such as fuses, ignition coils, etc. In 1996, it was privatised. Thenafter, it embarked on the practice of state-of-the-art technologies and products such as optoelectronic devices, ceramic ferrites, thin film resistors, sensors, piezoelectrics and semiconductors produced mainly for automotive industry. The firm already achieved OEM supplier level for major car brands. Process technology is based on the thick and thin film vacuum deposition techniques.

Case 4, IN, is a Hungarian intrapreneurial niche technology firm. It has been producing conventional auto parts and motors since 1992. During the last few years it extended its operations into a new technology track comprising the production of electric motors for alternative vehicles.

Control group cases, CC1 and CC2 are established Czech firms using conventional processes for technical ceramics. Both firms started operations during the mid 1990s as corporate spin-offs of large state-owned firms. This kind of firm formation has been a typical characteristic of Czech industry during the transition period. These firms usually accede to the practice and characteristics of the firm that they parted from. CC1 produces laboratory porcelains and ceramics. CC2 produces technical ceramic parts mainly high thermal resistance insulators. Processes used are classified as low to medium technology and involve powder metallurgy techniques of cold or hot pressing of ceramic powders. Products are sold to automotive, standard electronics, foundry, glass, textile industries.

4 Main Findings

The following discussion is organized to present descriptive findings on the effect of micro level technological and market-related factors on firm performance differentiating between entrepreneurial, intrapreneurial and conservative. Then, in the synthesis section, we try to answer the main research question regarding the fit between micro environment and macro environment to determine firm performance.

4.1. Technological opportunities

Technology generation. Table 4 suggests technology-related intra-organisational factors and firm performance are correlated, but there are differences among cases in terms of technology input, output and performance. Conservative firms exhibit significantly low levels of technological input into R&D, licensing and design activities, which explains almost non-existent levels of technological output as trademarks, patents and quality certificates. Paradoxically, the control group reports the highest number of innovations generated between

2007 and 2012. This is due to specialized supplier nature of these firms, which produce customized products. They regard each 'customer-oriented' product as an innovation, although majority of changes in the new product is nothing more than design alteration or products coming in different shapes. Firm relies on customer-guided designs, recipes for powder mixtures and all the technical drawings for product shape and tolerances supplied by client firms. Conservative firms show rather poor levels of sales growth (albeit still positive) and no growth or contraction in employment levels suggesting a bottleneck regarding exclusive engagement in mature technologies and their related products.

Entrepreneurial firms are characterized with high levels of R&D investment, own design conduct, significant level of patenting and innovation activity. These influence their high sales and employment growth rates. Intrapreneurial firms exert less effort and resources into technological input activities, which may explain their lower level patenting and innovation output compared to that of entrepreneurial firms, but still at a higher level than that of conservative firms. Sophisticated science based activities encourage developing their own technologies more effectively compared to niche technology firms, which deal with rather less sophisticated technologies in this sample.

Among all firms, ESB singles out with 4 new-to-world innovations, 12 patents and 7 trademarks registered during 2007-12 period. This firm has achieved remarkable sales growth rate of 50% per year along with 16% growth rate of employees from 2007 to 2012. EN also attained 10% sales growth and doubled its workforce based on factors arising from the niche market advantages as well as commitment in innovation activities. Similar trend is observed in IN. It did not inform about its R&D and design activity, but its one trademark and 8 new-to-firm innovations explain high growth rates in sales and employment. Its innovative activity is also related to its licensing activities. Despite input into R&D and design, ISB shows low-level innovative activity and 10% sales growth rate but a fall in employment figures.

Column II in Table 4 informs about the technology generation component of technological opportunities operating at macro-level. Whilst the opportunity provided by government procurement of advanced technology products is exploited by conservative firms and IN, IPR protection measures are very highly rated by entrepreneurial firms with registered patents explaining the intensive technological activity in this cohort. Yet, their very low rating for availability of R&D tax incentives suggests either their discontent indicating unfulfilled expectations from this policy tool. Conservative firms' low rating of R&D tax incentives is explanatory of their non-existent R&D activity. Data indicates that high-level assessment of at least one or two of the institutional factors (i.e. IPR protection rating of ESB and EN, R&D tax incentives rating of ISB and IN and government procurement rating of IN and the control group) suggest that firms pick the policy tool that is most in accordance with their strong technological activity. For ESB and EN, satisfactory level of IPR protection has positive influence on incentive to innovate and apply for patents. Regarding IN, the positive effect of government procurement of advanced products and R&D tax incentives may compensate for unreported R&D and design activities. Yet, discrepancy between entrepreneurial and

conservative firms' assessment for government procurement of advanced technology products hints that level of advanced products supported by this policy tool may not be very sophisticated indeed in the CEE region. Apparently, conservative firms exploit this tool for compensating their non-existent technological activities. Their medium-level rating illustrates its minor effects on slow growth rates, even if not able to prevent shrinking employment rates. Conversely, for entrepreneurial firms, this tool may also be used effectively targeting complex products, which could lead to higher growth rates for this cohort.

Human skills. Table 5 informs about firms' capacity of human capital endowment and seizing the opportunities. There is stark difference between conservative firms and the rest in terms of employment of graduate and postgraduate skills. Maximum share of skilled personnel in conservative firms is not above 4%, whereas it is not below 9% in entrepreneurial and intraprenurial firms, 51% in ESB. This pattern repeats for R&D staff in total employees. Entrepreneurial and intrapreneurial firms are distinguished from conservative firms with considerably higher shares of R&D personnel. The need for skilled researchers in science-based firms are self-explanatory, but such high levels in niche technology firms show that niche category is not at all confined to traditional firm approach. Highly skilled workforce is crucial in creating growth via its effect on technology generation.

Firms' approach to retain valuable skills within the firm comprised assessment of whether the firm invested in extensive workforce training to avoid brain drain. Science-based technology firms' efforts outperform those of conservative and niche technology firms. They invest heavily in training and retaining their employees who almost always remain in the firm. Conservative firms report medium-level scores indicating that they have mechanisms in place to effectively train and retain the workforce within the scope of their technological level. Niche technology firms, on the other hand, report low-level scores, whereby training environment and smaller size of these firms prevent them from accessing resources as aggressively as larger firms. They very poorly assess the level of education system in their country with regard to raising skills specifically for their technology field and local availability of specialized research and employee training services. Particularly the latter in electric vehicle technology is a major bottleneck, which indicates absence of institutional support for this specific niche technology. It seems that an intervention from institutional aspects help alleviate the obstacle perhaps resulting in even higher growth rates. Science-based firms and conservative firms report medium-level skills support. For conservative firms, own staff training efforts match with the local training availabilities, which suggests these firms can fully exploit available institutional opportunities. Conversely, science-based technology firms' own efforts outperform the local support.

Table 4. Case-ordered descriptive matrix: Micro-level and macro-level technological opportunity seizing towards technology generation and firm performance.

		I. Intra-organizational (micro) opportunities						II. Institutional (macro) opportunities			III. Firm performance	
								A	B	C		
	Firm code	R&D expenditures (% of total sales in 2012)	Main source of design activity	Innovations (2007-12)	Patents filed (2007-12)	Trademarks (2007-12)	ISO9001/ 14001 (2007-12)	Government procurement of advanced technology products	IPR protection	R&D tax incentives	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	**30%**	**Company's own designs**	**4 ntw***	**12**	**7**	**1**	3	**6**	2	**50%**	**16%**
	EN	**15%**	**Company's own designs**	**5 ntf, 5 ntc**	**1**	**1**	**2**	2	**7**	1	**10%**	**48%**
Intrapreneurial	ISB	**10%**	**Company's own designs**	**2 ntf**	0	0	**1**	2	3	**5**	**10%**	-4%
	IN	-	-	**8 ntf**	0	**1**	**1**	**5**	3	**7**	**17%**	**27%**
Conservative	CC1	0%	Customers' designs, other companies' designs, company's own designs	50 ntf	0	0	0	**4**	**4**	1	1.5%	0%
	CC2	3%	Customers' designs	150 ntf, 25 ntc	0	0	**1**	**4**	3	1	4%	-12%
		Average value for CZ, PL and HU A. Government procurement of advanced technology products and B. IPR protection (Source: WEF GCR, 2012)					2012-13	3	3.8	NA		

ntf: new to firm; ntc: new to country, ntw: new to world.

A. In your technology field, government procurement decisions result in technological innovation (1 = strongly disagree, 7 = strongly agree) (**WEFGCR Q.12.05:** Do government procurement decisions foster technological innovation in your country? [1 = no, not at all; 7 = yes, extremely effectively])

B. Intellectual property protection and anti-counterfeiting measures in your country are (1 = weak and not enforced, 7 = strong and enforced) (**WEFGCR Q.1.02:** How would you rate intellectual property protection, including anti-counterfeiting measures, in your country? [1 = very weak; 7 = very strong])

C. Availability of R&D tax incentives (1=not at all, 7=to a great extent)

Table 5. Case-ordered descriptive matrix: Micro-level and macro-level technological opportunity seizing towards human skills and firm performance

		I. Intra-organizational (micro) opportunities				II. Institutional (macro) opportunities		III. Firm performance	
				A	B	C	D		
	Firm code	University graduates + postgraduates (% in total employees)	R&D personnel (% in total employees)	Extent of staff training in the firm	Brain retain in the firm	Quality of educational system in raising skills in your technology field	Local availability of specialized research and training services	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	**51%**	**10%**	**6**	**6**	3	**4**	**50%**	**16%**
	EN	**17%**	**17%**	**2**	**2**	3	**1**	**10%**	**48%**
Intrapreneurial	ISB	**9%**	**8%**	5	6	4	4	**10%**	-4%
	IN	**14%**	-	**3**	**5**	**2**	**1**	**17%**	**27%**
Conservative	CC1	**8%**	3%	**4**	**5**	**4**	**4**	1.5%	0%
	CC2	4%	4%	**4**	**6**	**4**	**4**	4%	-12%
Average value for CZ, HU and PL. A. Extent of staff training, B. Brain drain, C. Quality of education system, D. Local availability of specialized research and training services (Source: WEFGCR, 2012)			2012-13	3.9	2.8	3.7	4.6		

A. General approach of your firm to human resources is (1 =little in training and employee development, 7 = invest heavily to attract, train, retain employees) (**WEFGCR Q.5.08:** To what extent do companies in your country invest in training and employee development? [1 = hardly at all; 7 = to a great extent])

B. Your firm's talented people (1 = normally leave to pursue opportunities in other firms, 7 = almost always remain in the firm) (**WEFGCR Q.7.07:** Does your country retain and attract talented people? [1 = no, the best and brightest normally leave to pursue opportunities in other countries; 7 = yes, there are many opportunities for talented people within the country])

C. Educational system /raising skills in your technology field (1 = does not meet the needs of a competitive economy, 7 = meets the needs) (**WEFGCR Q.5.03:** How well does the educational system in your country meet the needs of a competitive economy? [1 = not well at all; 7 = very well])

D. Specialized research/ employee training services in your technology field are (1 = not available, 7 = available from world-class local institutions) (**WEFGCR Q.5.07:** In your country, to what extent are high-quality, specialized training services available? [1 = not available; 7 = widely available])

Knowledge and value chain networks. Table 6 shows that firms cooperate with domestic and foreign partners ranging from universities and research institutes to customers and suppliers. For all firms, local connectedness seems more intense than foreign connectedness. However, forms of cooperation show heterogeneity between entrepreneurial, intrapreneurial and conservative firms.

ESB, ISB and IN are engaged in different forms of cooperation activities as well as in more complex forms of interaction such as R&D agreement. Conservative firms are characterized by lack of innovation cooperation. EN's networks are limited to technical support and licensing with suppliers and customers. Technical support, observed in all firms, relates to consultancy received from domestic institutes on how to operate and troubleshoot the state-of-the-art process technologies acquired from abroad. During the initial phases of process utilisation, this appears to be a cheaper strategy compared to requesting support from the foreign technology supplier. Deeper knowledge flow would comprise joint product innovation in the form of R&D agreement. Therefore, science-based firms and IN try to tap into knowledge sources of particularly domestic universities and research institutes.

Exporter firms report high-level embeddedness in value chains. This encompasses their primary activities related to inbound and outbound logistics, marketing and sales as well as secondary value chain activities of human resource management and technology development. Apparently, conservative firms seem to be more involved in primary value chain activities, whilst ISB is involved in both primary and secondary value chain activities.

Among all, EN singles out with low-level activity in innovation cooperation and very low-level value chain embeddedness. Despite that, EN exhibits high performance. Previous analysis of technology generation and human resources indicated that EN's activities are mostly generated from within the firm itself and not supported yet by the external environment. Complementing that, EN rates network related external factors low, i.e. quality of scientific research institutions, local supplier quantity and quality and state of cluster development. These ratings confirm EN's disconnection with knowledge networks and value chain partners. It seems that its internal efforts into a niche technological activity and successfully exploiting the niche markets explains high growth rates of EN.

Positive association between growth rates and forms and intensity of knowledge and value chain networks is clear for entrepreneurial and intrapreneurial firms. Lack of interactions explains low growth rates in conservative firms. Firms that benefit from knowledge networks highly rate scientific research institutions in terms of their quality in the field; firms that cannot develop interactions rate them low. Growth rates are visibly higher in ESB and IN which have intense knowledge linkages with research institutions that are considered strong organizations in their field. There aren't stark differences between entrepreneurial/ intrapreneurial firms and conservative firms in rating of indicators assessing local suppliers' quality and quantity indicating the existence of strong supply chain in this sector. Yet, in terms of efforts towards cluster development in their specific technology field, entrepreneurial/intrapreneurial firms expect widespread action at institutional level.

Table 6. Case-ordered descriptive matrix: Micro-level and macro-level technological opportunity seizing towards networks and firm performance

		I. Intra-organizational (micro) opportunities			II. Institutional (macro) opportunities				III. Firm performance	
				A	B	C	D	E		
	Firm code	Partner for innovation cooperation*	Form of innovation cooperation	Value chain breadth	Quality of scientific research institutions	Local supplier quantity	Local supplier quality	State of cluster development	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	**D. university D&F research institute D&F customer D&F supplier D. consultant**	**R&D agreement Licensing agreement Research contract-out Technical support Subcontracting**	**-**	**6**	**5**	**5**	3	**50%**	**16%**
	EN	**D. supplier D&F Customer**	Technical support Licensing agreement	2	2	3	**4**	2	**10%**	**48%**
Intrapreneurial	ISB	**D. university D. consultant D. research institute D&F Customer F. university**	**R&D agreement Research contract-out Technical support Subcontracting**	**6**	**4**	**4**	**4**	3	**10%**	-4%
	IN	**D university D Customer D Supplier D Consultant**	**R&D agreement Technical support Subcontracting Research contract-out**	-	**5**	**5**	**4**	**5**	**17%**	**27%**
Conservative	CC1	**D. customer D. university D. research institute D. supplier**	none	**5**	2	**4**	**6**	**4**	1.5%	0%
	CC2	**University Research institute Customer Supplier Consultant**	Technical support	**5**	3	**4**	**4**	**4**	4%	-12%
Average value for CZ, HU and PL. A. Value chain breadth, B. Quality of scientific research institutions, C. Local supplier quantity, D. Local supplier quality, E. State of cluster development (Source: WEF GCR, 2012)			2012-13	3.9	4.7	5	4.9	3.5		

Notes: D=domestic; F=foreign. * Partners are listed in order of importance as rated by the respondent firm.

A. If your firm is exporting, you are (1 = primarily involved in individual steps of the value chain, 7 = present across the entire value chain) (**WEFGCR Q.11.05:** In your country, do exporting companies have a narrow or broad presence in the value chain? [1 = narrow, primarily involved in individual steps of the value chain (e.g., resource extraction or production); 7 = broad, present across the entire value chain (i.e., do not only produce but also perform product design, marketing sales, logistics, and after-sales services)])

B. Scientific research institutions related to your technology field are (1 = non-existent, 7 = the best in their fields internationally)(**WEFGCR Q.12.02:** How would you assess the quality of scientific research institutions in your country? [1 = very poor; 7 = the best in their field internationally])

C. Quantity of local suppliers in your technology field in your country are (1 = non-existent, 7 = numerous and include the most important materials, components, equipment, and services) (**WEFGCR Q.11.01**: How numerous are local suppliers in your country? [1 = largely nonexistent; 7 = very numerous])

D. Quality of local suppliers in your technology field in your country is (1 = very poor, 7 = very good) (**WEFGCR Q.11.02:** How would you assess the quality of local suppliers in your country? [1 = very poor; 7 = very good])

E. In your country, how widespread are well-developed and deep clusters with regard to your technology field? (1 = non-existent; 7 = widespread) (**WEFGCR Q.11.03:** In your country's economy, how prevalent are well-developed and deep clusters? [1 = nonexistent; 7 = widespread in many fields])

4.2. Market opportunities

Market demand. Exporting is an established activity for conservative firms (Table 7). Their foreign market size is larger than their domestic market size. Entrepreneurial and intrapreneurial firms, on the other hand, attract significant demand from domestic market. Whereas ESB, IN and ISB report very low levels of foreign market demand,[11] EN enjoys existence in both domestic and foreign markets. EN's high growth rates can be explained by its products' internal and external market demand. Even without sufficient institutional support, EN shows it has established itself in the local niche market and able to move onto foreign markets. This success is related to its intra-organisational technological capabilities, which can respond to sophisticated performance-conscious buyers. It seems that as complexity of processes and products increase, i.e. ESB and ISB, firms tend to serve domestic market. Foreign market competition with advanced western counterparts operating at the technology frontier is fierce. These firms need to establish themselves within domestic market first in order to move onto foreign markets. When one closely analyses their assessment of buyer's sophistication with regard to their products – i.e. whether their customers' purchasing decision is based solely on the low price of products or product performance attributes, we see that ESB, ISB and IN all report medium to high. This indicates that their high technology products' performances – i.e. structural and functional properties of ceramic products (electric motors for IN), are not yet at the technology frontier level. Until then, these firms would produce for price-conscious buyers whether in domestic or foreign market. They need purposefully tailored technology policies in order to move up to the next level to serve performance-conscious buyers. EN is a very good example, which illustrates how targeting performance-conscious buyers can contribute to firm growth.

Finance availability. All firms financed their start-up stage using their own finances complemented by borrowing from banks. Apart from EN, because of the risky nature of niche technology, ease of access to venture capital is rated at medium to high. Major differences emerge among firms in terms of their financing of innovative activity. Conservative firms seem not to exploit available public funds efficiently for the purpose of innovation. EN shows similar pattern. This is due to their relatively not complex nature of innovation activities and thus do not fall into categories required for some specific public funds. This again points to necessity of arrangements on the policy side specific to niche technologies. Whereas ISB targets public grants rather than loans, ESB and IN exploit all funding mechanisms available to firms contributing to their growth performance by leveraging technology generation activities.

[11] ISB's share of exports in total turnover (73%) is mostly related to its conventional products that it has already been selling. However, its rating of foreign market demand for its high technology products is low, because this is related to its new activity in producing science-based products as an extension to its existing conventional products.

Table 7. Case-ordered descriptive matrix: Micro-level and macro-level market opportunity seizing and firm performance

		Market Demand				Finance Availability							
		Ia. Intra-organizational (micro) opportunities			IIa. Institutional (macro) opportunities	Ib. Intra-organizational (micro) opportunities (Private Finance)		IIb. Institutional (macro) opportunities (Public Finance)				III. Firm performance	
			A	B	C	D	E	F	G	H	I		
	Firm code	Exports (% in turnover in 2012)	Foreign market demand	Domestic market demand	Buyer sophistication	Own financial resources	Funding from a bank	Ease of access to venture capital	Public Loan from national government or local authorities	Public grant from national government or local authorities	EU funds (programs supporting SMEs, etc.)	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	1%	2	**7**	**4**	**5**	**4**	**5**	**5**	**6**	**6**	**50%**	**16%**
	EN	**60%**	**6**	**6**	**7**	**7**	**4**	3	2	**4**	1	**10%**	**48%**
Intrapreneurial	ISB	**73%**	3	**4**	**4**	**5**	3	**5**	1	**6**	2	**10%**	-4%
	IN	none	1	**5**	**5**	**7**	**5**	**4**	**7**	**7**	**7**	**17%**	**27%**
Conservative	CC1	**60%**	**4**	3	**4**	**7**	**4**	**4**	1	1	1	1.5%	0%
	CC2	**80%**	**7**	2	1	**7**	**4**	**4**	1	1	**4**	4%	-12%
Average value for CZ, HU and PL. A. B. Domestic/foreign market size, C. Buyer sophisitication, F. Venture capital availability (Source: WEF GCR, 2012)				2012-13	3.2		2.6	2.3					

A. Your firm sells its high technology products in the foreign market (1=none, 7= almost all production)

B. Your firm sells its high technology products in the domestic market (1=none, 7= almost all production)

C. Customers of your firm make purchasing decisions (1 = based solely on the lowest price, 7 = based on a sophisticated analysis of performance attributes) (**WEFGCR Q.6.16:** In your country, how do buyers make purchasing decisions? [1 = based solely on the lowest price; 7 = based on a sophisticated analysis of performance attributes])

F. How easy is it in your country for a firm with innovative but risky projects to find venture capital? (1 = impossible, 7 = very easy) (**WEFGCR Q.8.04:** In your country, how easy is it for entrepreneurs with innovative but risky projects to find venture capital? [1 = very difficult; 7 = very easy])

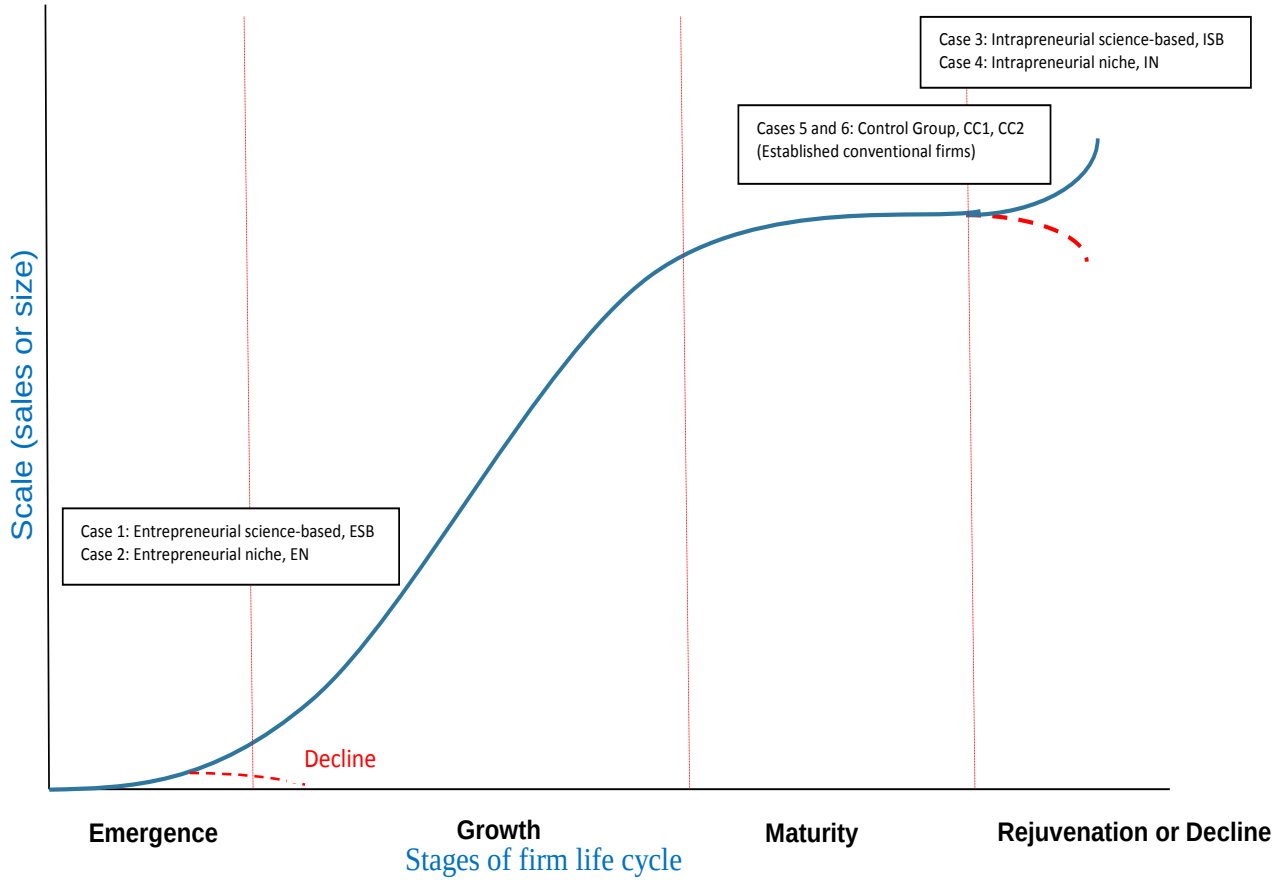
D, E, G, H, I: Availability of funding sources for innovation/networking/ease of access to other markets (1=not at all, 7=to a great extent) (**WEFGCR Q.8.05:** How easy is it to obtain a bank loan in your country with only a good business plan and no collateral? [1 = very difficult; 7 = very easy])

4.3 Synthesis

Figure 2 incorporates the data into a thematic conceptual matrix within the firm life cycle setting. Table 2 informs about the degrees for opportunity exploitation and seizing of the firms.

Departing from Figure 2, we construct the matrix analyses to help with mapping micro and macro level fit as presented in Figures 3, 4, 5, 6 and 7. We provide a visual presentation to look for fit between the micro and macro environments stemming from the above discussion on the effects of micro and macro-level opportunity exploitation and seizing on the firm sales performance.

Figure 2. Thematic conceptual matrix for opportunity exploitation and firm performance relationship within the firm life cycle setting

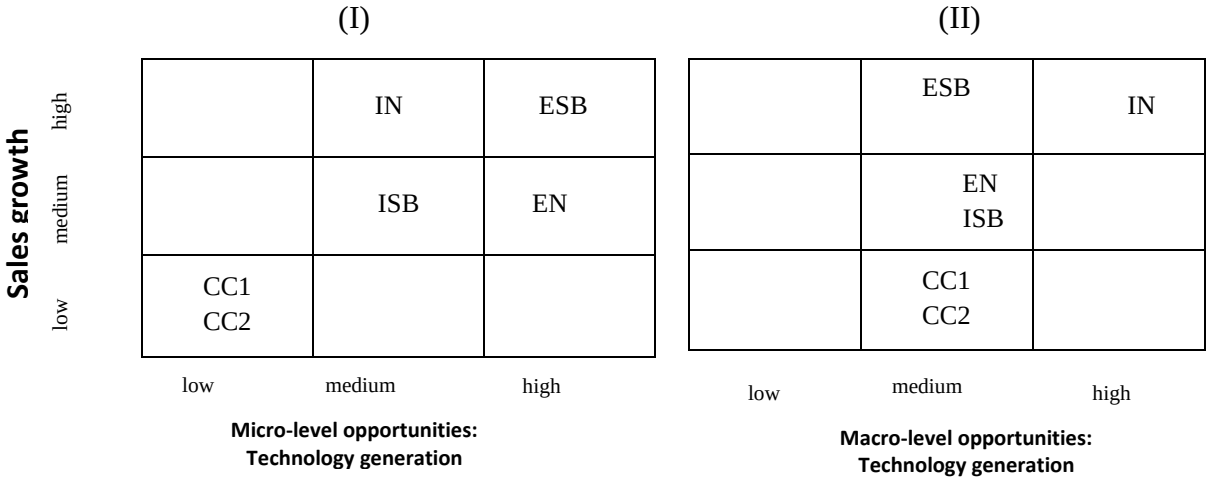


		Entrepreneurial firms		Conservative firms	Intrapreneurial firms	
		ESB	EN	CC1 and CC2	ISB	IN
Micro-level ooportuntinities	Technological opportunities	High level exploitation of R&D expenditures, design activities, patenting, new products		Low level exploitation of or no R&D expenditures, design activities, patenting, new products	Medium level exploitation of R&D expenditures, design activities, patenting, new products	
		High level exploitation of skilled workforce, staff training and retaining	High level exploitation of skilled workforce; low level exploitation of staff training and retaining	Low level exploitation of skilled workforce, medium level exploitation of staff training and high level staff retaining	Medium-High level exploitation of skilled workforce, staff training and retaining	High level exploitation of skilled workforce, medium level staff training and high level retaining
		High level exploitation of innovation cooperation	Low level exploitation of innovation cooperation and value chain	Low level exploitation of innovation cooperation, high level exploitation of value chain	High level exploitation of innovation cooperation and value chain	Medium-High level exploitation of innovation cooperation
	Market opp	High level exploitation of domestic market	High level exploitation of both domestic and foreign markets	Medium/High level exploitation of foreign market	Medium level exploitation of domestic market	High level exploitation of domestic market
		High level exploitation of own financial resources		High level exploitation of own financial resources	Medium level exploitation of own financial resources	High level exploitation of own financial resources
Macro-level opportunities		High level exploitation of IPR protection, low level exploitation of R&D tax incentives and government procurement of advanced technology products		Medium level exploitation of government procurement of advanced technology products and IPR protection, low level exploitation of IPR protection	High level exploitation of R&D tax incentives ,low level exploitation of IPR protection and government procurement of advanced technology products	High level exploitation of R&D tax incentives and government procurement of advanced technology products, low level exploitation of IPR protection
	Technological opportunities	Medium level exploitation of skills in the educational system and specialised research and training services	Low level exploitation of skills in the educational system and specialised research and training services	Medium level exploitation of skills in the educational system and specialised research and training services	Medium level exploitation of skills in the educational system and specialised research and training services	Low level exploitation of skills in the educational system and specialised research and training services
		High level exploitation of research institutions, local suppliers	Low level exploitation of research institutions, local suppliers and clusters	Low level exploitation of research institutions; medium level exploitation of local suppliers and clusters	Medium level exploitation of research institutions, local suppliers	High level exploitation of research institutions, local suppliers and clusters
	Market opp	Medium level exploitation of buyer sophistication	High level exploitation of buyer sophistication	Low/Medium level exploitation of buyer sophistication	Medium level exploitation of buyer sophistication	High level exploitation of buyer sophistication
		High level exploitation of public financial resources	Low/Medium level exploitation of public financial resources	Low level exploitation of public financial resources	Low/Medium level exploitation of public financial resources	High level exploitation of public financial resources
Sales growth rate		50% (fast)	10% (medium)	1.5% for CC1, 4% for CC2 (slow)	10% (medium)	17% (medium)
Employment growth rate		16% (medium)	48% (fast)	0% for CC1, -12% for CC2 (no growth/shrink)	-4% (shrink)	27% (fast)

Note for growth rate: Either sales or employment growth rate higher than 20% indicates fast growth (Coutu, 2014).
For Likert scale assessment: Low 1 to 3; Medium 4; High 5 to 7.

In Figure 3(I), it is the entrepreneurial firms that show the highest degree exploitation and seizing of micro-level opportunities in technology generation, whereas intrapreneurial firms show medium-degree exploitation. Figure 3(II) shows that IN is the only firm that is fully able to exploit macro-level technology generation opportunities. A careful examination of Figure 3(I) and Figure 3(II) shows the performance enhancing effects of macro-level opportunity exploitation particularly on IN, which can generate micro-level opportunities at medium degrees, but makes effective use of macro-level opportunities to elevate its sales growth rates. ISB, on the other hand, shows lower growth rate than that of IN, by medium-degree exploitation and seizing of both micro and macro-level technological opportunities. Both ESB and EN show high degrees of micro-level technological opportunities and complement this with high to medium-degree exploitation of macro-level technological opportunities in accordance with their intra-organisational competences. This, then, is evidenced in their very fast growth rates of either sales or employment. Even conservative firms seem to benefit from medium-degree macro-level opportunities as complementary to low degrees of micro-level opportunity seizing. This indicates to their efforts to fit their micro environment with the opportunities available in the macro environment to provide the optimal growth rates.

Figure 3. Mapping micro and macro-level opportunity exploitation related to technology generation and firm performance across cases.



As seen in Figure 4(I), ESB, ISB and IN can exploit micro-level opportunities in human skills, but ESB has clear advantages compared to the other two firms, particularly in terms of making the best out of the employment of highly skilled workforce. EN shows deficiencies in terms of staff training and brain retain. None of the firms can fully exploit the macro-level human skills opportunities.

A close examination of Figure 4(I) and Figure 4(II) shows that science-based firms can exploit macro-level opportunities at medium degrees, whereas niche technology firms comply with low degrees of human skills exploitation at macro-level. Particularly for EN, when this is led by medium-degree skills exploitation at micro-level, its combined effect on firm performance appears as lower growth rate compared to those of ESB and IN which show high-degree seizing of micro-level opportunities on human skills. For a good fit of micro and macro environments, firm level human skills need to be at high levels. Their level determines how much a firm can benefit from the institutional environment.

Figure 4. Mapping micro and macro-level opportunity exploitation related to human skills and firm performance across cases.

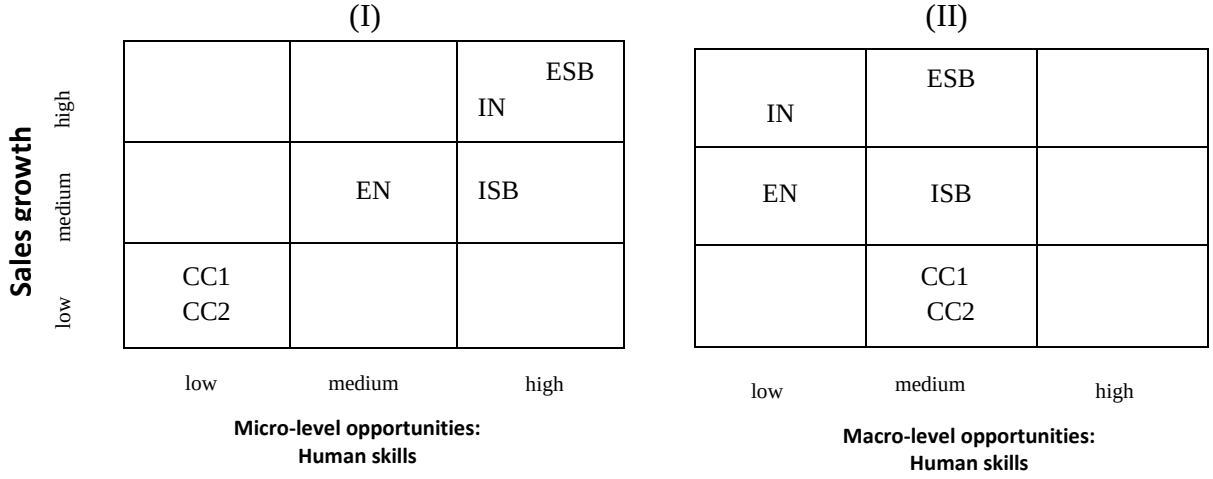


Figure 5(I) and 5(II) shows that exploiting network opportunities at the highest degree at both micro and macro-levels provides ESB and IN with high growth rates. EN, however, exhibits a paradoxical situation by not being able to make use of either micro-level or macro-level network related opportunities, despite considerably high growth rates. This compares to the conservative firms's opportunity exploitation and seizing degree, which is medium, but results in low growth rates. However, one must note that conservative firms are well embedded in the value chain that drives its strength in one aspect of networking. This observation takes us to fit issue, whereby firms' micro foundations determine their exploitation of macro environment to create the most optimal fit.

Figure 5. Mapping micro and macro-level opportunity exploitation related to knowledge and value chain networks and firm performance across cases.

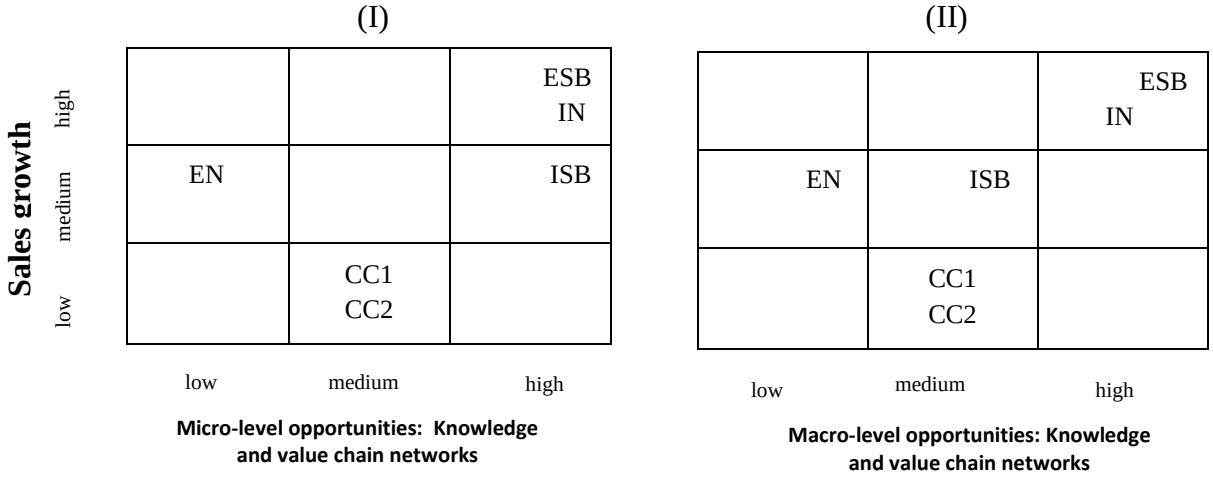


Figure 6(I) indicates each firm can exploit either domestic or foreign markets. EN singles out in exhibiting significant presence in both domestic and foreign markets in electric vehicles. Only conservative firms depict low-degree of opportunity exploitation at macro-level, which seems to drag down their growth rates (Figure 6(II)) due to mismatch between their micro and macro environments. The fit between micro and macro environments is very apparent for the entrepreneurial and intrapreneurial firms.

Figure 6. Mapping micro and macro-level opportunity exploitation related to real market demand and firm performance across cases.

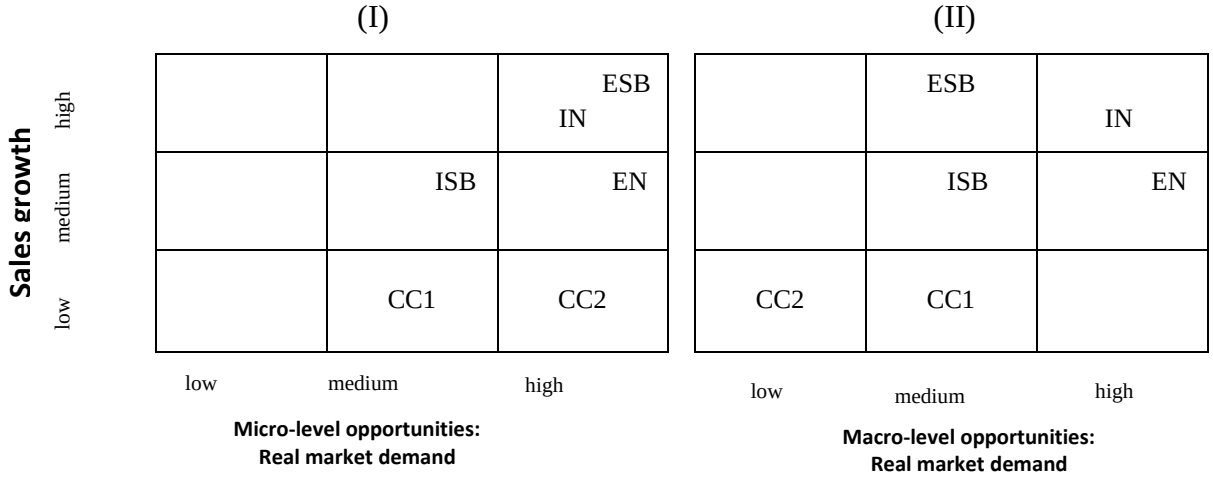
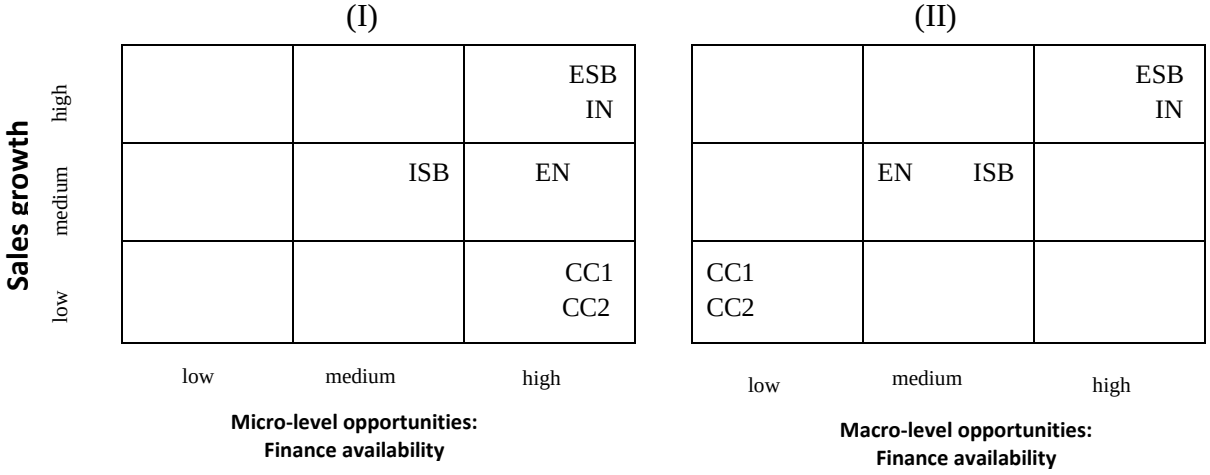


Figure 7(I) and (II) show that all firms exhibit high-degree of micro-level finance opportunity exploitation to start their operations, but macro-level opportunity exploitation for innovation funding varies among firms. ESB with high-degree exploitation of available funding at macro-level is able to generate the highest growth rate, whilst ISB with medium-degree macro-level opportunity exploitation shows lower growth rates. Conservative firms' unawareness of available funding for innovation is largely reflected in its slow growth rates.

Figure 7. Mapping micro and macro-level opportunity exploitation related to finance availability and firm performance across cases.



Finally, Table 8 synthesizes the outcomes from the above analyses. Micro and macro-level opportunity exploitation not only complement each other, but also can only complement each other under certain circumstances. Firms sense, select and seize macro-level opportunities, which are closely associated with the strength of their seized micro-level opportunity. Where micro-level opportunity exploitation is high, the related macro-level opportunity exploitation is likely and most of the time it is either high or medium-degree exploitation. Firms are able to fully make use of macro-level opportunities once they have associated micro-level competences in place, i.e. ESB, a patentor, fully exploits IPR protection measures; whereas ISB, an emerging patentor, is focused on making use of R&D tax incentives policy tool. ESB, ISB and IN, as collaborators in innovation, exploit services provided by scientific research institutions; whereas the conservative firms focus on local supplier quality in the value chain, but not scientific collaborators, to gain any returns for their growth. EN focuses on macro-level opportunity exploitation for real market demand, i.e. buyer sophistication, which is its strongest competence.

Where micro-level opportunity exploitation is medium or low, the associated macro-level opportunity exploitation is either at the same degree or less. However, IN and conservative firms show that they can exploit technology generation related macro-level opportunities better than they can their own micro-level opportunities. This is a result of their relatively more mature activities and products, which comes along with lower expectations in the institutional framework.

Table 8. The fit between micro-level opportunities and macro-level opportunities.

	Micro-level opportunities		Macro-level opportunities			Performance	
	Exploitation of technological opportunities	Exploitation of market opportunities	Exploitation of technological opportunities	Exploitation of market opportunities	The fit between micro and macro level opportunity exploitation	Sales growth (%)	Employment growth (%)
ESB	High	High	Medium to high	Medium to high	Young entrepreneurial firms are characterized with high sales and employment growth rates. Their pattern of micro and macro environment fit shows that the higher degree their micro capacities, at a higher degree they can exploit macro level opportunities. This in turn helps them grow faster. These firms have taken the challenge to create the fit between their micro and macro environment to stay in the emergence/growth stage of their life cycle instead of exit.	50	16
EN	Medium	High	Low to medium	Medium to high		10	48
ISB	Medium to high	Medium	Medium	Medium	Established intrapreneurial firms are characterized with high sales and employment growth rates compared to established conservative firms. Even though their degree of opportunity exploitation is lower than that of young entrepreneurial firms, their pattern of micro and macro environment fit also shows that the higher degree their micro capacities, at a higher degree they can exploit macro level opportunities. This in turn helps them grow faster. These firms have taken the challenge to create the fit between their micro and macro environment to extend their life cycle to rejuvenation stage.	10	-4
IN	Medium to high	High	Medium to high	High		17	27
CC1 **CC2**	Low to medium	High	Medium	Low	Established conservative firms are characterized with low sales and employment growth rates compared to young entrepreneurial and established intrapreneurial firms. In terms of technological opportunities, a fit can be observed in the micro and macro environments, but this is rather in a reverse way compared to that of entrepreneurial and intrapreneurial firms. Their low to medium degree micro foundations help them to exploit macro level technological opportunities at medium degrees. In terms of their market opportunities, on the other hand, there is no fir between their micro and macro environment. Their high degree of market opportunity exploitation at micro level prevents them from seeking better opportunities at macro level. Along with low level of technological opportunity exploitation, the misfit between market opportunity exploitation at micro and macro levels prevent them from growing at rates as high as those of young entrepreneurial and established intrapreneurial firms. These firms will stay in the market with modest growth rates until their products phase away and then exit the market or they will take the route of intrapreneurship and grow again.	1.5 4	0 -12

5. Conclusions and Policy Implications

Firm growth is associated with entrepreneurial and intrapreneurial activity and it is not a linear process. On the contrary, it is very much a non-linear process shaped by the fit between technological and market opportunities operating at both micro and macro-levels, if firms can exploit them. Effective exploitation and seizing of opportunities at micro-level may strengthen the effect of macro level opportunities to generate faster firm growth. Missed opportunities, on the other hand, create negative effect on firm growth. Firms, however, are inclined to choose and use the institutional tool, which best fits to their intra-organisational competence. Within that context, there are differences between entrepreneurial, intrapreneurial and conservative firms and major conclusions emerge from the above cross-case analyses.

Conservative firms exhibit slow sales growth rates and stationary or shrinking employment with low-degree of technological opportunity exploitation at micro-level. They have very low R&D investment, are engaged in trivial design activities, have low-degree of skilled labour in the firm and exhibit low or almost absent knowledge networking activity. The intensity of subcontracting activities linked to large western companies paving the way for easy access to export markets inhibits further investment in technological facets in conventional firms to achieve higher rates of growth. Their strong presence in foreign markets operating in more or less mature segments of the ceramics sector whereby buyers are price-conscious, but not performance-driven is influential factor for sustaining their sales growth. They are happy with the status quo and the degree of institutional support, which sustain slow sales growth rates over time. However, these factors do not affect their employment growth rates indicating long-term slow sales growth is not sufficient to create new jobs.

Entrepreneurial and intrapreneurial firms exhibit high sales growth conveying high employment growth rates. This growth can partly be explained by their capabilities in micro-level technological opportunity exploitation , i.e. technology generation activities measured by significant amount of investment in R&D, innovation, patenting, trademarks, investment in human capital, well-embeddedness in knowledge and value chain networks. This growth, however, is also related to their ability to fit their micro environment to their macro environment. There is discrepancy, though, among the four firms in their exploitation of macro-level opportunity exploitation. Whilst entrepreneurial firms exploit IPR protection policy tool to enhance their patenting and trademark activity, R&D tax incentives policy tool seems to push intrapreneurial firms to invest in R&D and innovate, perhaps a crucial factor as the source of their intrapreneurial activity, a diversion from their routine technological field. All four firms approach human capital, particularly skilled labour, as a valuable resource at micro-level. Yet, they cannot take full advantage of macro-level opportunities positioned in education quality and specialised research and training services availability. These areas need attention on the policy side. Cases presented here confirm results of firm level surveys in CEE assessing the quality of labour skills, which either do not match the requirements of businesses or businesses are unwilling to offer sufficient renumeration to attract workers with skills they need (EBRD, 2013). In stark contrast to control group and to compensate for highly skilled labour not available, entrepreneurial and intrapreneurial firms have strong

connections with domestic research and value chain sources. Contributing to their intense local embeddedness, they fully take advantage of the quality and quantity of these sources as supported by the institutional environment.

In terms of market opportunities, the contrasts between entrepreneurial, intrapreneurial and conservative firms are striking. Apart from EN, all three firms are present only in the domestic market, but are able to respond very quickly to buyers' requests in terms of performance and quality of products. Despite their deficiency in the export markets, they have existence in their domestic markets and they exhibit higher sales and employment growth rates. In order to access export markets these firms would need supportive institutional environment. Access to funding for innovation activities is crucial factor in entrepreneurship and intrapreneurship process. Data indicate that this is major hurdle for conservative firms. All of the entrepreneurial and intrapreneurial firms, on the other hand, exploit public grants locally available to fund their innovation activities. Among them, ESB and IN differ with their aggressive approach to public loans and EU funds. This degree of awareness in fundraising is promising factor in innovative activity, which can further enhance growth rates.

Several policy implications can be drawn from these findings. Findings suggest that firm level technical progress, market control and development of new knowledge-based entrepreneurial or intrapreneurial forms of activity proceed in tandem with favourable conditions in the institutional structure and the extent that firms are able to exploit these favourable conditions; that is, progress in one field augments progress in the other.

There is need for carefully tailored institutional support for firms that embark on the challenge to start completely new line of activity in the firm to bring more growth in sales and employment. For EN this would be in improving human capital and knowledge networking in order to sustain growth by raising innovativeness. For IN this would be human capital and R&D support along with access to export markets. For ESB and ISB, this would be supporting them in joining into export and value chain networks. For the established conservative firms this would be encouraging them towards intrapreneurial activity, since it acts as a driver of sustained growth in both sales and job creation.

Making the most use of macro-level opportunities needs strong capabilities in exploiting micro-level opportunities. In other words, the best 'fit' between micro and macro-level opportunity exploitation depends on high-degree micro-level opportunity exploitation, which drives the purposefully selected tools from available macro-level opportunities and exploits them to the maximum.

Finally yet importantly, entrepreneurship should be encouraged, but policy goals aimed at higher employment also demands supporting intrapreneurship. Furthermore, based on the results from this study, if low sales growth rates coupled with employment growth can be sustained in established conservative companies by creating the delicate balance between their micro foundations and what can be offered to them in the macro environment, this should be considered as a policy target.

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