Profiting from IT investments in Small and Medium Enterprises:The Italian evidence

Profiting from IT Investments in Small and Medium Enterprises: The Italian Evidence

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Abstract – Thanks to the commoditization of software and the rise of the cloud computing paradigm, today Information Technology (IT) may have far-reaching effects upon different industries. Due to their particularities, Small and Medium Enterprises (SMEs) may however encounter several obstacles in using IT to enrich their base of capabilities. Accordingly, this paper examines the diffusion patterns of IT-based capabilities in SMEs and - drawing on the resource-based-view and contingency theory- it analyzes how the industry environment influences the impact of these capabilities on performance. Specifically, data are gathered through a survey conducted among 238 firms in Italy in 2009. Results show that outcomes of IT investments related to internal efficiency improvements are more diffused than uses of IT enhancing the capabilities related to the firm's external orientation towards its customers and suppliers. Also, econometric analyses show that in more dynamic industries firms enjoy lower returns on profitability from their IT-based capabilities. By contrast, in more munificent industries firms enjoy superior the returns from enriching their capabilities base through IT. Managerial implications of these results are discussed.

1. Introduction

In the last few years the rise of the cloud computing paradigm for Information Technology (IT) sparked interest in studying how diffusion of these technologies and their impact on performance are evolving. There is broad consensus that the decreasing price and the commoditization of enterprise systems and some other information technologies (e.g. RFID, wireless sensor networks) that is now occurring may favour a dramatic acceleration in the diffusion of IT among firms, providing thereby many enterprises with increased opportunities for innovations in business models, products, and organizational processes. With the reduction of costs and technology barriers to IT deployment in firms, differences in IT adoption and use may become more nuanced across industries. Accordingly, IT may become for many firms less strategically important, being for them increasingly difficult to achieve differentiation from competitors through IT use.

In such a scenario it is important to understand whether in Italy Small and Medium Enterprises (SMEs) will continue to under exploit the potential value of IT assets, as they have been doing so far (e.g. Fabiani et al., 2005). Despite information systems are an enabler of more internal transparency and better coordination practices in the stage of business growth of small firms (Street and Meister, 2004), SMEs usually under invest in IT due to some of their structural weaknesses. Specifically, SMEs' managers and external consultants usually

lack appropriate expertise and absorptive capacities on applying IT effectively to innovate internal routines and business processes (Thong et al., 1996). Because of this weakness, these firms rarely approach IT as a strategic lever. Furthermore, the lower human capital and the greater barriers that SMEs face in investing in human resources respect to their larger counterparts may impede them to undertake the complementary investments in the organizational capital that are fundamental for the IT payoff to manifest (Giuri et al., 2008). These flaws are particular evident in Italy, where in the last few years SMEs have exhibited limited innovation capacity, less educated labour and one of the slowest productivity growth in the European Union (Hall et al., 2009).

The arguments discussed above highlight that - despite emerging IT may have far-reaching effects upon different industries - in SMEs the diffusion of the capabilities that are based on use of IT (henceforth IT-based capabilities) may lag behind the adoption of IT resources and may show significant industry-level differences. Indeed, the development of these capabilities may depend on industry-specific effects such as institutional norms affecting managers' decisions about IT investments, availability of industry "vertical" IT solutions, specificities in information processing requirements, maturity of the demand. These factors influence firms' capacity to invest in IT and in the related human and organizational capital. In this regard, despite the evolving nature of IT has significantly inspired empirical research on the business value of IT (e.g. McAfee et al., 2007, Melville et al., 2007), Information Systems (IS) research has overlooked how IT-based capabilities are actually diffused among SMEs and how - depending on differences in information requirements and competition patterns - industry characteristics affect the impact on performance due to such organizational capabilities. This limit is in part due to the difficulties in building rich data sets that can collect extensive information about how firms support their business functions through IT. This problem has led many IS studies (e.g. Santhanam and Hartono, 2003) to analyze the economic and organizational impact of IT by focusing on measures of IT that consider input measures (i.e. expenditures in the technology) or very aggregate views on IT-based capabilities. The limited attention upon studying industry influence on IT business value is reflected at the managerial level in difficulties SMEs experience on the following issues: 1) readapting standardized IT solutions and complementary practices to the operational specificities of a sector, 2) ineffective managerial decision-making in the selection of information systems according to industry-specific requirements, 3) uncertainties in assessing the economic returns that IT investments may generate depending on a firm's environment.

This study represents a first attempt to bridge the above-mentioned research gap and it undertakes the following research questions: (1) Which are the diffusion patterns of IT-based capabilities in SMEs? (2) Do industry environmental conditions moderate the relationship between IT-based capabilities and performance? In considering the industry environmental influence on IT diffusion and returns, the focus is upon the level of dynamism and munificence. Dynamism refers to the rate of instability in an industry (i.e. changes in customers preference, the pace with which firms develop new products and technologies). Munificence refers to the extent to which the environment can support sustained growth. To investigate the two above research questions, the study formulates some hypotheses grounded on contingency theory and the resource-based view. The hypotheses are tested on a sample of 238 Italian SMEs.

2. Theoretical background and hypotheses

2.1 IT-based capabilities: what they are

Following a common approach in IS literature, in this study we draw on a definition of IT-based capabilities as "complex bundles of IT-related resources, skills and knowledge, exercised through business processes, which enable firms to coordinate activities and make use of the IT assets to provide desired results" (Dale Stoel and Muhanna, 2009). The development or the enrichment of firms' capabilities through innovative use of IT reflect the outcome of IT assimilation processes, through which firms become able to incorporate and routinize IT resources into their business processes to enhance performance (Amstrong and Sambamurthy, 1999). Accordingly, firms may develop two types of IT-based capabilities: (1) "externally-oriented" or (2) "internally-oriented" capabilities. The former allows firms to respond in a timely way to changes in markets and technologies and to shifts of customers and suppliers. The latter originates in the use of IS for improving their internal efficiency and the managerial control on operations. By contrast with a part of IS studies, this definition of capabilities reflects a focus on the outcome of IT adoption processes, rather on its antecedents. Indeed, some previous studies (Wade and Hulland, 2004; Piccoli an Ives, 2005) interpret capabilities related to IT as the preconditions for its successful assimilation. These studies therefore refer to the coordination mechanisms between business functions and the IT staff, the governance systems for IT decisions, the technical skills and the absorptive capacities in the IT domain. Given this focus, these works cannot fully assess whether IT

diffusion resembles the adoption patterns of a General Purpose Technology (Bresnahan and Trajtenberg, 1995) generating economic growth in the majority of industries.

2.2 The returns of IT-based capabilities: the contingency perspective

Following the discussion above, our focus on IT-based capabilities may allow to investigate the competitive value of IT more in-depth. In this perspective, the resource based view (Barney, 1991) and the contingency approaches to organization design and management of IS (e.g. Lawrence and Lorsch, 1967; Raymond, 1990) provide appropriate arguments to understand how IT may impact a firm's performance.

Dynamism and munificence are the two most important contingency factors that affect how firms create resources and the competitive value of the capabilities that they develop from their use. For example, IT-based capabilities affecting a firm's external orientation towards its customers and suppliers may be more valuable in more dynamic industries, as environments where new threats can appear suddenly and opportunities may be short-lived require firms the ability to recognize these changes and respond quickly. In a similar way, in high-munificent industries growth in the demand and the existence of greater market opportunities make firms with greater product development capabilities, superior market knowledge and entrepreneurial capacities more likely to improve their performance. Conversely, "internally-oriented" IT-based capabilities might have a more critical importance on a firm's competitiveness in more mature (less dynamic) and stable environments, being such markets less forgiving on operational inefficiency. As such, we could expect what follows.

H1.A The lower the environmental dynamism, the higher is the impact of internally-oriented capabilities on firm performance.

H1.B The lower the environmental munificence, the higher is the impact of internally-oriented capabilities on firm performance.

H2.A The higher the environmental dynamism, the higher is the impact of externally-oriented IT-based capabilities on firm performance.

H2.B The higher the environmental munificence, the higher is the impact of externally-oriented IT-based capabilities on firm performance.

2.3 The returns of IT-based capabilities: the strategic perspective

Contingency theory does not however take into adequate account that - in the light of a broad diffusion of IT due to commoditization trends in enterprise systems - on the long run some of

the capabilities that firms develop from IT investments might not allow firms to sustain superior profitability respect to competitors. This may especially occur when capabilities are the results of "frugal" innovations that reflect the industry norm for IT investments and when they are based on the adoption of "off-the-shelf" technologies. Thus, as the resource-based-view (RBV) suggests, the returns from IT investments are more likely to be lower in industries exhibiting high market turbulence and competition among large enterprises, as these environments are more likely to exhibit rapid responses from competitors to a firm introducing a new technology (Piccoli and Yves, 2005). Where these conditions occur, firms may not appropriate returns from their IT-based capabilities, as the productivity growth enabled by IT-based innovation is transferred to greater consumer surplus and not to higher firms' profitability (Hitt and Brynjolfsson, 1996). Indeed, the presence of low barriers for followers to imitate early adopters' successful IT initiatives favours more aggressive price competition, in industries with a stagnating demand in particular. Furthermore, in industries with high dynamism, isolating mechanisms and barriers to imitate IT resources may be weak also because these industry have historically attracted a great number of vendors offering industry-specific IT solutions (Neirotti and Paolucci, 2011). This fact may have favoured a greater number of firms to adopt IT assets in the earlier stage of their diffusion curve, thus at a higher cost (and at a lower "appropriability rate") respect to firms in other industries. Based on these arguments, we expect what follows.

H3. The higher the dynamism and IT adoption rates within an industry, the lower is the impact of a firm's IT-based capabilities on its profitability differentials respect to competitors.

2.4 Conceptual framework

Figure 1 shows the conceptual model followed to validate the above-mentioned hypotheses. Industry munificence and dynamism are thus considered as factors moderating the impact of IT-based capabilities on profitability.

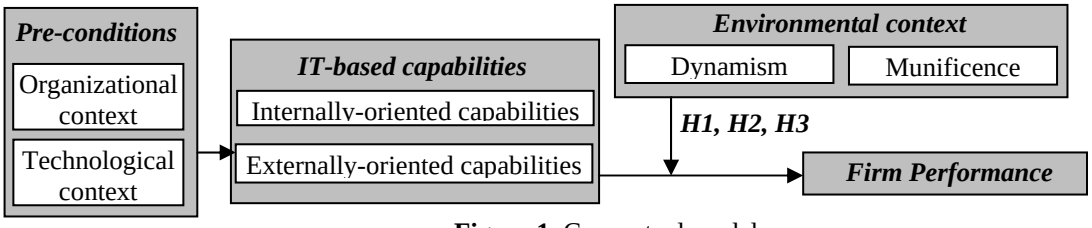

Figure 1. Conceptual model

Endogeneity may affect the linkage between capabilities and performance, as unobserved firm-specific factors (due to better management approaches or to some other idiosyncratic

factors) may co-determine both the development of IT-based capabilities and superior performance. If firms that develop IT-based capabilities are in general better managed, Ordinary Least Square (OLS) regression model may overstate the impact of IT investments on profitability. Thus, treatment regressions models based on a two-steps approach may allow to deal with the problem of correlation among firm-specific unobserved factors and IT-based capabilities. More specifically, these types of models estimate two regressions simultaneously: the first is a probit regression predicting the probability of a "treatment", i.e. the condition where firms have developed one of the IT-based capabilities under consideration. The second is a linear regression for profitability as a function of the treatment variable, controlling for observable cofounders. Specifically, the probit treatment equation allows to model each type of IT-based capability as depending on certain technological preconditions related to IT adoption and to certain organizational characteristics.

Following the discussion above, the technology preconditions shown in the conceptual model refer to adoption and the deployment of information systems in a firm's routines that can be at the origin of the development or the enrichment of its capabilities. With regard to the organizational preconditions that can be relevant to the development of IT-based capabilities, there is broad consensus in previous studies (e.g. Amstrong and Sambamurthy, 1999, Wade and Hulland) on the importance of horizontal integration coordination mechanisms among business lines and IT department in the planning process of IT investments. In the case of SMEs these conditions are reflected into the existence of a CIO-like role who is at the same time accountable of management of information systems and involved in managing business improvement programs. The job required to this person should be thus similar to the one that in a large enterprise a CIO performs by interacting frequently with the top management team.

3. Research methodology

3.1 Sample and data collection

The data used for this study are derived by a survey carried out on a population of 5,600 SMEs between February and April 2010 in the Piedmont region, in Italy. The survey is part of the output of a regional research observatory on the Information Society that is conducted every year since 2005.

Located in Northwest Italy, Piedmont has a population of 4.4 million and an annual per capita GDP of €28,800, which is among the highest in Europe (Eurostat 2008). One of the peculiar characteristics of the Piedmont production system is its polarisation between a few large

enterprises, which are concentrated in Turin, and some geographically concentrated clusters of SMEs operating in specific sectors, such as the automotive, textile, agriculture, wine and food sectors and software and IT services.

The survey was conducted on four industry groups: 1) manufacturing industries, 2) wholesale and retail trade; 3) business services; 4) transportation and logistics. Table 1 shows the sample composition divided by size and industry.

Table 1. Sample composition (number and percentage of firms)

Industry	**Small**	**Medium**	**Total**
Manufacturing industries	71 (29.83%)	51 (21.43%)	122 (51.26%)
Wholesale and retail trade	48 (20.17%)	10 (4.20%)	58 (24.37%)
Transportation and logistics	8 (3.36%)	6 (2.52%)	14 (5.88%)
Business services	27 (11.34%)	17 (7.14%)	44 (18.49%)
Total	*154 (64.71%)*	*84 (35.29%)*	*238 (100.00%)*

To guarantee a homogeneous sample in terms of IT requirements, industries that use IT in highly specific ways, such as multimedia, software, IT services and financial services were not surveyed. In the data collection process about 2,000 companies in the population were randomly selected and were contacted by phone to identify key respondents within the managerial cadre. A representative sample of 360 firms provided usable response for the purpose of this study. Nevertheless, the limited availability of data on financial performance from the AIDA database (Bureau Van Dijk) reduced our sample to 238 observations. Specifically, non-response bias was tested on the basis of size, industry type, profitability, fixed assets and value added per employee. None of these comparisons revealed any sample bias.

3.2 Measures

3.2.1 Capabilities

Using a five-point Likert scale with responses ranging from “strongly disagree” (-2) to “strongly agree” (+2), respondents had to evaluate whether IT led to a significant impact on a series of items related to the firm’s internal and the external orientation. To help respondents report objective evaluations, we asked them to base their assessment on the impacts observed over the previous 3 years (between 2007 and 2009). Principal Component Analysis (PCA) was applied to these items. The analyses separated four types of capabilities generated from use of IT resources (see table 1 in the Appendix). Each item loaded higher on only one factor, thereby supporting the discriminant validity of the measures. The first factor refers to

internally-oriented IT capabilities as it reflects how IT deployment favoured improvements in internal efficiency through a reduction in both sales, general and administrative costs and in cost of goods/services sold. The second factor refers to the impact of IT in new product/service development processes and it considers how IT affected knowledge use and coordination across functions and collaboration with customers, suppliers and other external partners in this process. As such, it represents an externally-oriented IT capability, as well as the third factor, which refers to the improvement of market capabilities through improvements in knowledge of customers' behaviour and in service-levels in sales and after-sales activities ("improved market capabilities"). The fourth factor reflects how firms leveraged IT and e-business initiatives to increase their revenues volume, by entering in new segment markets (in Italy or abroad) or by increasing their penetration in the current market segments.

In treatment regression models used to estimate the capabilities impact on performance each capability was dichotomized (1 for high and 0 for low-value sets), based on the median value of each variable. The reasons to do so lies in the need to operazionalize the development/enrichment of IT-based capabilities as the presence of a treatment in the econometric model used to estimate IT impact of capabilities on profitability.

3.2.2 Environmental conditions

To operationalize the environmental context, we combined some approaches that were inspired on Dess and Beard's (1984) work on the influence of environment factors on technology strategies and organization configurations. Specifically, dynamism and munificence of each industry were assessed using data from AIDA and Istat. To do so, we classified industries using ATECO classification at the three digit.

We measured dynamism by considering turbulence in the distribution of revenues within each industry using firm-level data from AIDA about revenue concentration. Specifically, the dynamism of an industry of year *t* was calculated as the average of the absolute value of rank change of all firms in that industry from year t-*1* to *t*. We used rank change instead of absolute change in revenues because it helps mitigate the impact of outliers on our results. Given this property, rank change has been used in a number of other studies to measure industry turbulence (e.g. Comin and Phillipon, 2005).

To provide further validity for the use of this measure, we also operationalized dynamism as the variability in annual industry sales, following the approach used by Dale and Muhanna (2009). To do so, for each sector the industry-level total sales for 5 years (from 2005 to 2009)

were regressed on the year variable and dynamism was measured as the standard error of the regression slope coefficient of annual industry sales divided by the industry mean for the 5 year period. The Spearman correlation coefficient between our dynamism measure and this scale was 0.399 (p-value<0.1%). This empirical check thus suggests that turbulence in market shares may adequately reflect environmental dynamism.

By using the same data on total industry sales revenues, munificence was measured as the growth rate in annual industry sales for 5 years, measured as the regression slope coefficient divided by the average industry sales.

For both dynamism and munificence we ranked the values by year and split the industries into two sets (high and low), based on the median value for that characteristic. This choice was mainly motivated by the distribution of the two measures, which resulted non-normal from a Shapiro-Wilks test.

3.2.3 Performance

IT impact on performance was estimated by considering changes in ROA and EBITDA/Revenue, labour productivity and sales revenues over the 2006-2009 period.

First, with regard to profitability, for each year and each firm we considered the differences in ROA and the EBITDA/Revenue ratio respect to the median value in a peer group composed by all the Italian firms in the same industry segment (defined at a 3-digit level of ATECO code). This procedure allowed to assess whether in the period under analysis a firm has achieved a competitive edge (or disadvantage) or has bridged (or increased) a former competitive delay. This measure of profitability also controls indirectly for economic cycles (and thus the shift to a recession phase occurred in 2008) and other macroeconomic factors such as industry concentration.

Second, to measure the impact of IT on labour productivity, we examined changes in the value added per employee ratio between 2006 and 2009, deflating the nominal values to the year base 2000. The value added deflators estimated by Istat for each industry aggregation were used for this purpose. We used the same approach for estimating the growth rates of sales revenues over the period 2006-2009.

It is worth noticing that we did not lag any performance indicator like in other studies on business value of IT (e.g. Brynjolfsson and Hitt, 2000), because our choice of measuring capabilities as the result of assimilation of IT in business processes postulates that we already

controlled for the delay (i.e. the so-called “assimilation gap” in IS research) between adoption of the innovation and manifestation of its outcomes.

3.2.4. Technological and organizational preconditions

The preconditions related to the state of information systems adoption was measured by considering whether the firm had adopted three types of enterprise systems: 1) ERP packages; 2) CRM systems; 3) product data management (PDM) or product lifecycle management (PLM) systems, supporting collaboration and document management within the product life cycle. These information systems are expected to have positive effects on production and administrative activities, sales and marketing, and on product development processes.

Concerning the organizational preconditions, we readapted Amstrong and Sambamurthy’s notion of “relationships assets” to the particular case of SMEs. Specifically, we took into exam the use of horizontal coordination routines in the IT planning process (“IT-business horizontal integration” mechanisms). Respondents were required to evaluate on a Likert scale the degree of involvement for the top management team (i.e. the CEO and/or the COO and/or another role specifically in charge of IT decisions) in the following tasks:

1. the selection of information systems and the definition of their business requirements
2. the decision-making process for business strategy choices involving the domain of IT and e-business
3. change management endeavours induced by IT adoption projects and concerning organizational structures, business processes and reporting systems.

The organizational preconditions also included firm size (number of employees in logarithmic form) and the type of ownership. Type of ownership was considered as business units of foreign or national groups may encounter more favourable conditions to IT adoption. Indeed, as recent empirical evidence shows (Bloom and Van Reenen, 2010), multinational enterprises’ have a greater propensity to adopt innovative managerial practices that are complementary to IT and this holds particularly true for non Italian firms. Furthermore, large firm groups are expected to exhibit a greater propensity to IT adoption because of higher coordination needs among their units and thanks also to a rapid replication of best practices and IT solutions across their units (Tractinsky and Jarvenpaa, 1995).

3.2.5. Control variables

Three industry dummies were used as control variables to discern among four industry classes. For manufacturing, we distinguished high and medium tech (HMAN) from low-tech traditional manufacturing industries (OECD, 2009). For services, we distinguished among material and information services sectors (MSERV and ISERV), following Porat and Rubin's (1978) dichotomy of services according to the physical versus information-based nature of services. These industry dummies allowed to control for the effects of the typical technology needs that characterize each industry clusters and that are not necessarily captured by the two environmental factors investigated in this study. To validate hypothesis H3 we also defined a dummy variable *IND_IT_INT* that includes industries that are expected to be intensive users of IT. As such, this dummy includes firms in medium and high-tech industries (for manufacturing) and in information services (software, consulting and other professional services).

4. Findings

The empirical analysis followed a two stages process. First, descriptive statistics were computed to analyze the diffusion patterns of capabilities and the related technologies. In the second phase, we used treatment regression models to analyze the impact of firms' IT-based capabilities on performance.

4.1 Descriptive statistics

Table 2 shows descriptive statistics and highlights that the improvements in internal efficiency (*IIE*) have been the most experienced outcome of IT investments in the sample (median value equal to 0.33). By contrast, product development capabilities, market capabilities and business growth capabilities resulted particularly rare (the median values of the scales measuring these capabilities were 0). This fact reflects the rare diffusion of the information systems that are expected to affect the development of these capabilities. Indeed, only 14% of the sample adopted CRM packages in sales and marketing, and only a 3% used PDM or PLM solutions supporting the product development process. Instead ERP systems exhibited a higher adoption rate (about 38%), which is consistent with the fact that the improvement of internal efficiency was perceived as the most diffused IT-based capability.

It is worth noticing that few firms exhibited formalized horizontal coordination mechanisms between business functions and the IT staff. Specifically, more than 50% of firms did not

show any type of a manager's involvement in decisions related to information systems (the median value of the *IT_BIM* variable is equal to 0).

Table 2. Descriptive statistics

Constructs	Variables	Name	Min.	Max.	Mean	Median	St. Dev.
Organizational preconditions	Local unit of a foreign group	*FOR*	0.00	1.00	0.05	0.22	0.23
	Local unit of an Italian group	*ITA_GR*	0.00	1.00	0.09	0.29	0.29
	Size	*SIZE*	1.00	2.40	1.55	1.51	0.37
	IT-business horizontal integration mechanisms	*IT_BIM*	0.00	3.00	0.74	0.00	0.94
Technological preconditios	ERP adoption	*ERP*	0.00	1.00	0.38	0.00	0.49
	CRM adoption	*CRM*	0.00	1.00	0.14	0.00	0.35
	PDM/PLM adoption	*PXM.*	0.00	1.00	0.03	0.00	0.16
Internally-oriented capabilities	Improvements in internal efficiency	*IIE*	-2.00	2.00	0.19	0.33	0.82
Externally-oriented capabilities	Improved New Product development capabilities	*NPD_CAP*	-2.00	1.50	-0.25	0.00	0.81
	Improved market capabilities	*MKT_CAP*	-2.00	1.75	0.05	0.00	0.88
	Business growth capabilities	*BG*	-2.00	2.00	-0.47	0.00	0.95
Environmental conditions	Munificence	*MUN*	0	1	0.64	1.00	0.04
	Dynamism	*DYN*	0	1	0.38	0.00	0.48
Performance (*FP*)	ROA (changes between 2006 and 2009)	ΔROA	-15.80	24.81	0.42	0.19	5.84
	Ebidta/Revenues (changes between 2006 and 2009)	$\Delta EB/REV$	-16.33	67.36	1.22	0.43	7.26
	Value added per employee (changes between 2006 and 2009-thousands of revenues)	*ΔVA/Emp*	- 88.34	81.12	-5.83	-4.65	18.56
	Revenue growth rates between 2006 and 2009	*REV_GROW*	-0.753	9.80	0.02	-0.10	0.91

4.2 IT-based capabilities: antecedents and impact on performance

4.2.1. Preconditions of IT-based capabilities development

Table 3 reports the outcome of the OLS regression models used to estimate the antecedents of the development of IT-based capabilities. For each capability type, the table reports also the probit regressions that were used as the first step in treatment regression models. These analyses confirm previous evidence on the importance of IT-business horizontal integration mechanisms for the development of both externally and internally-oriented IT capabilities. Indeed, it resulted that only business growth capabilities do not depend on the existence of this precondition.

Table 3. Antecedents of IT-based capabilities: outcomes of OLS and probit regression models (robust standard errors in parentheses)

Dep. Var/Ind. Var.	*IIE (1)*	*IIE_D[(a)] (2)*	*NPD_ CAP (3)*	*NPD_ CAP_D[(a)] (4)*	*MKT_CA P (5)*	*MKT_CA P_D[(a)] (6)*	*BG_CAP (7)*	*BG_CAP_ D[(a)] (8)*
Constant	-0.085 0.253	-0.204 (0.397)	-0.416 (0.251)	-1.125 (0.434)	-0.040 (0.246)	0.372* (0.149)	-0.220 (0.312)	-0.893 (0.455)
ERP	0.223† (0.118)	0.295 (0.192)	0.136 (0.115)	0.267 (0.202)	0.350** (0.118)	0.164* (0.071)	0.131 (0.149)	0.322 (0.213)
PXM	0.104 (0.332)	-0.101 (0.364)	0.328 (0.304)	0.192 (0.613)	-0.111 (0.272)	-0.106 (0.221)	0.534† (0.277)	1.127† (0.644)
CRM	0.194 (0.253)	0.244 (0.253)	-0.116 (0.143)	-0.452† (0.258)	0.260† (0.142)	0.117 (0.092)	0.263† (0.149)	-0.172 (0.268)
SIZE	-0.001 (0.161)	-0.061 (0.257)	-0.160 (0.171)	0.042 (0.268)	-0.271† (0.162)	-0.072 (0.096)	-0.358† (0.205)	-0.066 (0.292)
IT_BIM	0.176*** (0.049)	0.195* (0.093)	0.128* (0.052)	0.267** (0.097)	0.203*** (0.055)	0.091* (0.036)	0.089 (0.062)	-0.006 (0.107)
FOR	0.218 (0.136)	0.334 (0.35)	0.287† (0.148)	0.270 (0.359)	0.106 (0.118)	0.158 (0.134)	0.791*** (0.159)	0.915* (0.374)
ITA_GR	-0.061 (0.179)	-0.090 (0.290)	0.069 (0.158)	0.069 (0.100)	-0.165 (0.195)	-0.144 (0.106)	0.262 (0.207)	0.015 (0.330)
HMAN	0.266* (0.135)	0.642* (0.308)	0.337* 0.156	0.372 (0.311)	0.221 (0.165)	0.092 (0.117)	-0.086 (0.189)	-0.062 (0.325)
MSERV	0.024 (0.131)	-0.116 (0.198)	0.308* 0.121	0.461* (0.218)	0.407** (0.133)	0.108 (0.076)	0.131 (0.144)	-0.054 (0.231)
ISERV	0.210 (0.139)	0.304 (0.246)	0.622*** (0.159)	1.011*** (0.260)	0.293† (0.157)	0.159† (0.092)	0.324† (0.184)	0.461† (0.260)
$R^{2(b)}$	9.79%	5.84%	13.23%	12.46	15.60%	10.33%	11.09%	7.03%
Regres-sion	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit

****p-value < 0.1%; ** p < 1%; * p < 5%; † <10%*

[a] *The variable is the dichotomized form of the corresponding factor.*

[b] *For probit estimates the table reports pseudo R square*

The above models highlighted other three important facts. First, they confirmed that ERP had a positive impact on efficiency savings and CRM had a beneficial impact on market capabilities. Second, IT resulted more broadly used and routinized in business processes in information services and hi-tech manufacturing sectors. Specifically, information services firms exhibited superior externally-oriented capabilities, and hi-tech firms showed superior uses of IT in supporting improvements in internal efficiency (models 1 and 2). Third, local units of foreign groups were more likely to develop business growth capabilities through IT use (models 7 and 8). By contrast, business units of Italian groups did not report superior capabilities from IT use.

It is worth noting that these specifications were able to explain a limited portion of variance in dependent variables. It is important to recall two reasons that may explain this limitation. First, despite the variables depicting the organizational and technological preconditions are

shown to have a significant role in the development of organizational capabilities, they capture only a marginal portion of firms idiosyncratic factors related to their operational and managerial practices. Second, we could not take into exam the linkages among the four capability types under analysis, due to the endogeneity problems in establishing causality verses between them. Indeed, because of the impossibility in building times series or in controlling the time from the introduction of a given technology or from the moment it was fully assimilated in firms' processes, we could not take into account that firms accumulate IT assets and develop/enrich the related capabilities over time by following a certain consequentiality.

4.2.2. Effects of IT-based capabilities on performance

In the second step of the treatment regression model (table 4[1]), we investigated the performance impact associated with the development of IT-based capabilities and the way industry conditions moderate this relationship.

Overall, we found that the development of each type of IT-based capabilities had a positive impact on performance and that industry environmental characteristics significantly moderate this impact. We illustrate empirically significant interaction effects in figures 1 and 2 in the Appendix. Although high correlations among interaction terms (see table A2 in the appendix) make it difficult to precisely estimate interaction coefficients simultaneously (Kennedy, 1998), we are able to show that interaction effects of capabilities with dynamism or munificence are statistically significant in most of the estimated models. Also, we calculated a partial Chi-square statistic to test the significance of the three-order interaction effect due to the combination of dynamism, munificence and IT-based capabilities. This test indicates that including the three way interaction variables improves the base model significantly only when the impact of business growth capabilities on EBITDA/revenues is estimated (model 14 of table 4).

In hypotheses H1.A and H1.B, we argued that internally-oriented capabilities have a greater impact in industries exhibiting lower dynamism and lower munificence, respectively. As shown in model 1 of table 4, improvements in internal efficiency are positively and significantly correlated with improvements in the two profitability differentials under consideration (p-value less than 0.1% in models 1 and 2). However, dynamism negatively

[1] For each model considering changes or growth rates in a given financial performance, the variable $FP_i(2006)$ represents a control for the respective firm's financial performance in 2006.

moderates the relationship between internally-oriented capabilities and ROA (coefficient equal to -2.444 and p-value less than 10%), with the development of internally-oriented capabilities leading to a greater profitability differential in more stable (less dynamic) industries. Furthermore, as shown in model 4, in more dynamic industries improvements in internal efficiency had a negative impact on revenue growth rates. In a similar way, the interaction of this capability type and dynamism on labour productivity is negative, although not significant. These results provide some degree of support to hypothesis H1.A. By contrast, we did not find any negative interaction between munificence and improvements in internal efficiency (hypothesis H1.B is not supported).

In hypotheses H2.A and H2.B, we posited that externally-oriented capabilities have a greater impact on performance in more turbulent and munificent industries, respectively. Table 4 shows that the three types of externally-oriented capabilities under consideration have almost systematically positive effect on performance. The only exception are the impact of market-based capabilities on labour productivity and revenue growth rates (models 7 and 8) and the effect of business growth capabilities on ROA differentials (model 13). In contrast with hypothesis H2.A, we found multiple evidence that dynamism negatively moderates the performance impact on profitability differentials due to product development capabilities. Specifically, models 9 and 10 show that the interaction of product development capabilities and dynamism impacts negatively on the ROA and EBITDA/Revenues differentials (the coefficients are -4.518 and -2.945 respectively, and the p-values are less than 0.1% and 10%). A similar negative interaction effect occurs when labour productivity and the revenue growth rate are taken into exam (models 11 and 12).

By contrast, hypothesis H2.B finds some degree of support. Indeed, market munificence positively moderates the impact of product development competencies and business growth capabilities on firms' profitability differentials. Specifically, as shown in models 9 and 10, the interaction effect due to the presence of product development capabilities and munificence is positive and significant on ROA and EBITDA/Revenue differentials (coefficients are equal to 4.328 and 3.747, and p-values are lower than 1% and 5%, respectively). Moreover, as figure 1(h) in the appendix illustrates, in environments that exhibit both turbulence and dynamism firms that developed business growth capabilities had a higher positive impact on profitability differentials with respect to firms that achieved this outcome in industries with other conditions. Indeed, as shown in model 14 of table 4, when the treatment effect on firms' differentials in the EBITDA/revenue ratio are estimated, the three order interaction between

business growth capabilities, dynamism and munificence is positive and significant, (coefficient is equal to 8.130, p-value < 10%). This result thus sounds as a confirm of the lower “destructive” nature of competition in less mature and more munificent industries, being competition in these sectors more likely based on product innovation rather than on price wars.

Furthermore, in hypothesis H3, we posited that the higher the turbulence and the adoption of IT in an industry, the lower is the impact of each type of IT-based capabilities. This hypothesis thus advances some arguments that are in contrast to the ones inspiring hypothesis H1. Following the discussion above, the fact that dynamism negatively moderates the impact of product development capabilities on profitability differentials sound as an argument in support of hypothesis H3. To provide a more comprehensive support to this hypothesis, in other models we estimated separately the interaction effects due to IT-based capabilities and the dummy for IT intensive industries (table 5). Models 5 and 7 of table 5 highlighted that in IT intensive industries returns on profitability differentials from product development and business growth capabilities were less salient, when ROA is taken under consideration. These evidence thus provide a partial support to the hypothesis.

Table 4. Effects on profitability differential from the second step (main equation) of the treatment regression model. Moderating effects of industry dynamism and munificence.

	Dep. Var. FP	Type of treatment effect (CAP)		*SIZE*	*$FP_i(2006)^{(a)}$*	*DYN*	*MUN*	*DYN x CAP*	*MUN x CAP*	*MUN x DYN*	*MUN x DYN x CAP*	*rho*	*Chi Square d.f.*
1	*ΔROA*	*IIE*	7.963***	-1.450	-.525***	2.319**	-1.226	-2.444†	0.447	....	....	-0.737*	184.77***
			(1.725)	(1.008)	(0.046)	(0.897)	(0.916)	(1.322)	(1.380)			(0.110)	(34)
2	*ΔEB/REV*		8.688***	-1.976	-0.547***	1.590	0.307	0.185	0.553	....	....	-0.833***	273.57***
			(1.741)	(1.257)	(0.038)	(1.031)	(1.052)	(1.533)	(1.607)			(0.068)	(34)
3	*ΔVA/Emp*		28.581***	-2.012	-19.540***	0.709	-0.164	-2.217	-4.334	....	....	-0.862**	199.19***
			(4.792)	(3.645)	(2.042)	(2.914)	(2.924)	(4.309)	(4.510)			(0.051)	(34)
4	*REV_GRO W*		0.438	0.711*	-0.397***	0.027	-0.208	-0.432†	0.0410	....	....	-0.046	70.10**
			(0.475)	(0.220)	(0.063)	(0.167)	(0.171)	(0.248)	(0.257)			(0.358)	(34)
5	*ΔROA*	*MKT_ CAP*	8.718***	-1.792*	-0.529***	1.021	-1.116	0.723	-.482	....	....	-0.852**	247.66***
			(1.327)	(0.854)	(0.045)	(0.843)	(0.900)	(1.308)	(1.380)			(0.053)	(33)
6	*ΔEB/REV*		6.471**	-1.395	-0.533***	2.234*	0.389	-0.707	-0.339	....	....	-0.638†	236.53***
			(2.106)	(1.027)	(0.040)	(1.019)	(1.075)	(1.590)	(1.643)			(0.147)	(33)
7	*ΔVA/Emp*		8.049	0.767	-20.313***	-0.859	1.139	2.865	-5.980	....	....	-0.171	139.15***
			(8.986)	(2.918)	(2.195)	(2.933)	(3.089)	(4.639)	(4.710)			(0.391)	(34)
8	*REV_GRO W*		0.474	0.7120**	-0.396***	-0.123	-0.155	-0.186	-0.020	....	....	-0.055	69.61***
			(0.314)	(0.208)	(0.063)	(0.158)	(0.165)	(0.249)	(0.254)			(0.217)	(33)
9	*ΔROA*	*NPD_CAP*	8.300***	-1.341	-0.555***	2.138**	-2.369**	-4.518**	4.328**	....	....	-0.893**	265.97***
			(1.288)	(1.068)	(0.045)	(0.773)	(0.842)	(1.364)	(1.661)			(0.062)	(34)
10	*ΔEB/REV*		7.716***	-1.508	-0.554***	1.993*	-0.488	-2.945†	3.747*	....	....	-0.813***	292.25***
			(1.711)	(1.171)	(0.038)	(0.905)	(0.907)	(1.650)	(1.792)			(0.084)	(34)
11	*ΔVA/Emp*		25.745***	-0.011	-19.927***	2.929	-3.174	-12.920**	7.687	....	....	-0.828***	205.98***
			(4.749)	(2.702)	(2.029)	(2.565)	(2.625)	(4.736)	(5.017)			(0.071)	(34)
12	*REV_GRO W*		1.124***	0.489*	-0.317***	-0.030	-0.332*	-0.726**	0.782**	....	....	-0.817***	125.53***
			(0.213)	(0.192)	(0.058)	(0.138)	(0.139)	(0.257)	(0.273)			(0.048)	(34)
13	*ΔROA*	*BG*	2.417	-0.714	-0.511***	1.368†	-0.500	-0.025	-3.144†	....	....	0.082	169.22***
			(2.789)	(0. 856)	(0.046)	(0.761)	(0.766)	(1.648)	(1.705)			(0.350)	(34)
14	*ΔEB/REV*		5.125†	-1.104	-0.516***	0.325	0.503	-2.063	-6.355**	1.050	8.130†	-0.228	236.71***
			(2.855)	(0.988)	(0.040)	(1.473)	(1.143)	(3.626)	(2.378)	(1.831)	(4.267)	(0.264)	(36)
15	*ΔVA/Emp*		22.443*	-0.263	-20.162***	-0.669	0.577	3.166	-11.340*	....	....	-0.507	141.47***
			(8.907)	(3.037)	(2.221)	(2.518)	(2.577)	(5.305)	(5.457)			(0.260)	(34)
16	*REV_GRO W*		1.054***	0.535*	-0.359***	-0.122	-0.302*	-0.280	0.501†	....	....	-0.774***	109.12***
			(0.245)	(0.224)	(0.061)	(0.137)	(0.140)	(0.273)	(0.279)			(0.054)	(34)

****p-value<0.1%; **p< 1%; *p<5%; †<10%. All regression include dummies for industries according to the ATECO classification at the second digit level*

Table 5. Effects on profitability differential from the second step (main equation) of the treatment regression model. Moderating effects of IT intensive industries (hi-tech and information service sectors)

	Dep. Var.	Type of treatment effect (CAP)		*Size*	*Y_i (2006)*	*IT_INT_IND*	*IT_INT_IND x CAP*	*MUN*	*DYN*	*rho*	*Chi Square (d.f.)*
1	*ΔROA*	*IIE*	7.240*** (1.654)	-1.439† (0.861)	-0.529*** (0.0466)	0.747 (1.159)	-(1.267) (1.315)	-1.223† (0.694)	1.196† (0.694)	-0.722† (0.119)	180.14*** (33)
2	*ΔEB/REV*		8.961*** (1.537)	-1.627† (0.992)	-0.549*** (0.038)	0.974 (1.357)	-0.620 (1.547)	0.413 (0.811)	1.604* (0.808)	-0.819** (0.076)	272.55*** (33)
3	*ΔROA*	*MKT_CAP*	8.943*** (1.129)	-1.395 (1.102)	-0.534*** (0.045)	-0.421 (1.069)	0.938 (1.234)	-1.150† (0.676)	1.164† (0.668)	-0.874*** (0.045)	263.08*** (34)
4	*ΔEB/REV*		6.540*** (1.587)	-1.485 (1.172)	-0.534*** (0.039)	0.248 (1.231)	1.350 (1.518)	0.061 (0.815)	1.540† (0.799)	-0.727** (0.098)	255.40*** (34)
5	*ΔROA*	*NPD_CAP*	8.289*** (1.595)	-1.050 (1.020)	-0.536*** (0.046)	0.605 (1.025)	-2.334† (1.330)	-1.382* (0.688)	1.183† (0.688)	-0.799† (0.103)	208.42*** (34)
6	*ΔEB/REV*		8.078*** (1.643)	-1.411 (1.163)	-0.541*** (0.039)	0.301 (1.189)	-0.139 (1.594)	0.272 (0.811)	1.351† (0.800)	-0.766** (0.102)	271.32*** (34)
7	*ΔROA*	*BG*	3.667 (3.777)	-0.892 (0.888)	-0.516*** (0.046)	1.774* (0.843)	-3.289* (1.506)	-1.303† (0.698)	1.016 (0.684)	-0.214 (0.473)	173.37*** (34)
8	*ΔEB/REV*		2.318 (2.953)	-1.316 (1.018)	-0.513*** (0.040)	1.273 (0.979)	0.463 (1.763)	0.042 (0.814)	1.515† (0.798)	-0.110 (0.312)	217.16*** (34)

****p-value<0.1%; **p< 1%; *p<5%; †<10%. All regression include dummies for industries according to the ATECO classification at the second digit level*

4.2.3 Robustness Checks

A natural concern is whether our results are a consequence of our choice of metrics and parameters. In unreported regressions, we modified our analyses in several ways to explore the robustness of our findings. We looked at other operationalizations of the treatments. Specifically, for each capability we used two alternative operationalizations, with the treatment corresponding to values of the capability estimated on the 5-likert scale superior to 0.5 and 1, respectively. The results are consistent with those presented in this paper.

5. Conclusions, managerial implications and direction for future research

5.1 Conclusions

Our study investigates the effects of IT-based capabilities on performance. In so doing, this work provides some findings that are both relevant to the debate on the strategic value of IT and to the discussion on Italian SMEs' structural limits to innovation adoption.

With regard to the first point, findings provide some degree of support to arguments from RBV and to contingency approaches to management of IS. Indeed, consistently with contingency theory, we found evidence supporting that in more munificent industries returns from IT investments are higher when firms use IT to develop product development capabilities and for supporting its relationships with customers and suppliers in this process. However, our evidence also confutes in part contingency theory, by showing that in less dynamic industries capabilities that support a firm's external orientation have a greater strategic value. Instead, according to contingency theory, these capabilities would be less critical in more stable (less dynamic) environments respect to improvements in operational efficiency. A reason for this result may lie in a classical RBV argument. Indeed, in industries exhibiting less discontinuities, firms are more likely to sustain superior economic returns when they differentiate their competencies base respect to competitors in a way where IT is used to execute "proactive" strategies based on enhancing their products development processes. In stable environments, this choice may be more successful in generating competitive advantages respect to "defensive" strategies focused exclusively on efficiency improvements.

Another argument for explaining the lower returns from IT investments in turbulent industries may lie in SME's particularities and in the inherent nature of information systems. Despite IS research (e.g. Sambamurthy et al., 2003) emphasizes that in turbulent environments IT potentially allows firms to improve their strategic flexibility and to undertake a greater

number of competitive actions, in SMEs' information systems may decrease their operational and strategic agility. Indeed, the more firms have achieved business processes integration through IT, the harder is to reconfigure their structure around new "organizational architectures" to respond to environmental changes (Brandyberry et al. 1999). Reconfigurations of organizational structures based on intensive use of IT may imply complex adjustments dynamics, especially in smaller firms where IT investments generate critical sunk costs. This argument appears consistent with recent evidence (Giuri et al., 2008) showing weak complementarities in SMEs in combining IT expenditures with investments in human capital and in organizational transformations. Given the simplicity of SMEs' organizational structures, it appears that an intensive use of IT associated with skilled people and new organizational practices may unnecessarily overburden the educated employees. In other words, following the discussion above, we can posit that when SMEs deploy information systems in their organizational routines, the rigidity of such technologies may impede them to fully grasp their benefits. This occurs as under high environmental turbulence SMEs have to sustain considerable adjustment costs to reconfigure their IT solutions and the associated routines. By contrast, when firms have to reconfigure frequently their routines, informal coordination channels and "labour intensive" control heuristics may result more flexible than information systems.

With regard to the country specific issues, this study - by providing evidence on the limited diffusion of certain capabilities - confirms previous evidence on the under exploitation of the IT business value in SMEs, and in the Italian ones in particular (Hall et al., 2009). In so doing, the paper gathers fine-grained evidence on the poor use of IT in SMEs' interaction with suppliers and customers. In so doing, the paper provides evidence that are consistent with the results of studies showing a limited deployment of IT in industrial districts and enterprise networks in Italy (Chiarvesio, 2004; Belussi, 2005).

A natural concern in relation to these results is whether the current evolution of IT may actually remove part of the obstacles to adoption and economic returns of IT discussed above. Specifically, evolution of IT towards Service Oriented Architecture and "Software as a Service" delivery models for enterprise systems promises companies to dramatically reduce the total cost of ownership and the flexibility of information systems, thereby removing the constraints to IT use related to the inherent rigidity of IT solutions. However, we believe that - despite the current commoditization of software - in absence of investments in human capital and in managerial expertise required to accumulate absorptive capacities in the IT domain, in

the next few years SMEs may likely encounter problems in enriching their competencies base through IT adoption. Despite this appears a speculative interpretation of our result, it proposes a direction for future studies on the topic.

5.2 Managerial implications

The paper offers three types of implications for managers involved in the selection of IT solutions in SMEs. First, our findings reinforce the idea that firms should consider carefully their unique industry conditions before adopting emerging IT. More specifically, the negative moderating impact of industry dynamism on the relationship between IT-based capabilities and performance emphasizes the need of enhancing the flexibility of information systems to respond to market turbulences. With the regard to the role of IT in firms innovation heuristics, the paper suggests that IT may have a role in favouring ambidexterity, by supporting firms in the creation of both internal capabilities aimed to efficiency improvements and external capabilities favouring the development of new product (and increased effectiveness in their development process) and/or the entry in new market segments. With this regard, the paper however shows that just a very small percentage of firms are able to use IT to support their ambidexterity. Finally, results - by showing that in munificent industries the development of IT-based capabilities can produce higher economic returns - stress the importance for many Italian SMEs in mature industries of a strategic repositioning in market segments with greater business growth opportunities.

5.3 Limitations

Besides these issues, the paper presents stimuli for further studies, which mainly originate in some weaknesses of this research. In this regard, it may be useful to highlight some weaknesses which may raise some concerns. First, SMEs could be isolated by the environmental conditions occurring in their industry as they may be positioned in market niches that are “protected” by the competitive forces occurring at the industry level. To overcome this problem, future studies could check measures of dynamism and munificence at the macro-economic level with managers’ perceptions about the environmental forces occurring at the firm level. Second, some concerns can be raised on how much our results can be generalized given our focus on Italian SMEs, and on the Piedmont region, in particular. With this regard, some particularities of the regional industrial system (e.g. a high specialization on automotive, the lack of large firms pushing their small suppliers towards an

integration of information systems for supply chain management) may make our sample biased in terms of IT adoption respect to the population of firms localized in other European regions (e.g. the Lombardy area in Italy) with a high economic development and a considerable presence of large enterprises. An extension of the survey to SMEs in other regions could overcome this limitation. Finally, the data were collected from a single respondent at single point in time rather than observed directly through field-based study. This is currently the standard methodology in strategy research, but it has certain drawbacks. We tried to correct these drawbacks through our selection of respondents who were sufficiently knowledgeable about the business. Moreover, in SMEs this approach may present lower drawbacks respect to larger enterprises, as in SMEs CEOs and other managers are usually more generalists and may be thus more knowledgeable about IT-related issues. These limitations notwithstanding, our study may produce important suggestions for future studies on the business value of IT in SMEs.

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8. Appendix

Table A1. IT-based capabilities: Factor Analysis

Type of effects due to IT in last 4 years		mean	S.D.	F1	F2	F3	F4
BG(F1)	An increase in revenue due to a growth in the market share	-0.386	1.055	0.260	0.179	0.159	**0.786**
	An increase in revenue due to the entry in new market segments	-0.491	1.028	0.251	0.091	0.236	**0.863**
	An increase in revenue due to the market expansion/entry abroad	-0.636	1.088	0.255	0.172	0.114	**0.762**
IIE(F2)	Increased efficiency of administrative activities	0.098	1.005	-0.054	**0.661**	0.236	0.455
	Reduction in the ratio costs of goods/services sold over sales revenues	0.203	1.028	0.176	**0.747**	0.132	0.335
	A more timely and thorough management accounting system	0.345	1.041	0.247	**0.782**	0.244	0.114
	An improvement in inventory control	0.310	1.138	0.185	**0.710**	0.338	-0.038
	A reduction in the order cycle time	0.073	1.071	0.563	**0.621**	0.127	0.077
	Improved quality controls on products/services	0.098	1.090	0.517	**0.603**	0.172	0.051
NPD_CAP (F3)	Growth in the number of new product/services developed	-0.225	1.077	**0.549**	0.357	0.157	0.334
	Reduction in the failure risks of new products	-0.649	1.060	**0.748**	0.044	0.247	0.214
	Reduction in time-to-market for new products	-0.538	1.024	**0.781**	0.081	0.171	0.307
	Improved data management in the product development process	0.016	1.105	**0.649**	0.272	0.159	0.163
	A growth in the number of partners and strategic suppliers involved in the product development process	-0.228	1.062	**0.595**	0.076	0.391	0.207
	Increased collaboration with suppliers involved in product design and engineering	-0.142	1.090	**0.520**	0.205	0.495	0.086
MKT_CAP(F4)	Increased knowledge on customer needs and purchasing habits	-0.117	1.131	0.240	0.159	**0.738**	0.170
	Increased control on sales, included sales agents	-0.051	1.148	0.180	0.154	**0.836**	0.076
	Better support to sales employees	-0.089	1.095	0.238	0.155	**0.807**	0.117
	Improved after-sales services	0.196	1.078	0.100	0.183	**0.585**	0.087
	Initial eigenvalue			8.247	1.673	1.545	1.326
	Proportion of variance explained [%]			43.4	8.8	8.1	6.9
	Cumulative variance explained [%]			43.4	52.2	60.3	67.3
	Cronbach's Alpha			0.857	0.872	0.827	0.872
	Kaiser-Meyer-Olkin measure of sampling						0.889

Table A2. Spearman correlation matrix

		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1	*SIZE*	1.000												
2	*FOR*	.107	1.000											
3	*ITA_GROUP*	.135*	-.077	1.000										
4	*IT_BIM*	.254**	.012	.197**	1.000									
5	*HITECH*	.162*	.122	.044	.037	1.000								
6	*MSERV*	-.171**	-.002	-.026	.011	-.265**	1.000							
7	*ISERV*	-.020	-.014	-.034	.104	-.182**	-.311**	1.000						
8	*DYN*	-.073	-.021	.026	-.030	.046	-.369**	.415**	1.000					
9	*MUN*	.034	-.050	.119	-.045	.014	-.099	.325**	.374**	1.000				
10	*IND_IT_INT*	.128*	.113	-.001	.117	.575**	-.460**	.676**	.355**	.271**	1.000			
11	*ERP*	.403**	.115	.137*	.222**	.171**	-.155*	-.024	-.033	.016	.129*	1.000		
12	*CRM*	.161*	.064	.082	.235**	.020	-.007	.165*	.009	.074	.142*	.160*	1.000	
13	*PLM*	.060	-.039	.226**	.141*	.172**	-.050	.066	-.001	.065	.177**	.149*	.168**	1.000
14	*IIE*	.132*	.085	.033	.237**	.069	-.084	.088	.040	.034	.132*	.163*	.074	.085
15	*NPD_CAP*	-.003	.084	.022	.187**	.004	.049	.247**	.085	.119	.211**	.066	.027	.090
16	*MKT_CAP*	.013	.059	-.015	.268**	-.004	.141*	.090	-.072	-.090	.076	.166*	.186**	.059
17	*BG*	-.060	.183**	.090	.123	-.049	.014	.145*	.038	.058	.096	.083	.135*	.140*
18	*Δ(ROA)*	-.094	-.081	-.103	-.036	.028	-.034	-.039	.028	-.065	.013	.008	.000	.013
19	*Δ(EBITΔA)*	-.085	-.057	-.058	-.094	.015	-.096	.081	.147*	.044	.080	-.014	-.003	.007
20	*Δ(VAAD_EMP)*	-.105	-.016	-.023	-.007	-.105	.052	.089	-.013	.000	-.019	-.083	.027	.014
21	*REV_GROWTH*	-.100	-.015	-.010	.110	-.153*	.190**	.210**	-.089	.032	.060	-.050	.057	.005

****p-value<0.1%; **p< 1%; *p<5%; †<10%. (continue)*

		14	15	16	17	18	19	20
14	IIE	1.000						
15	NPD_CAP	.546**	1.000					
16	MKT_CAP	.462**	.517**	1.000				
17	BG	.403**	.494**	.299**	1.000			
18	Δ(ROA)	.029	.030	.111	.052	1.000		
19	Δ(EBITΔA)	-.004	.045	.029	.102	.772**	1.000	
20	Δ(VAAD_EMP)	.013	-.017	.059	-.040	.484**	.454**	1.000
21	REV_GROWTH	.087	.130*	.176**	-.001	.257**	.126	.499**

***p-value<0.1%; **p< 1%; *p<5%; †<10%.

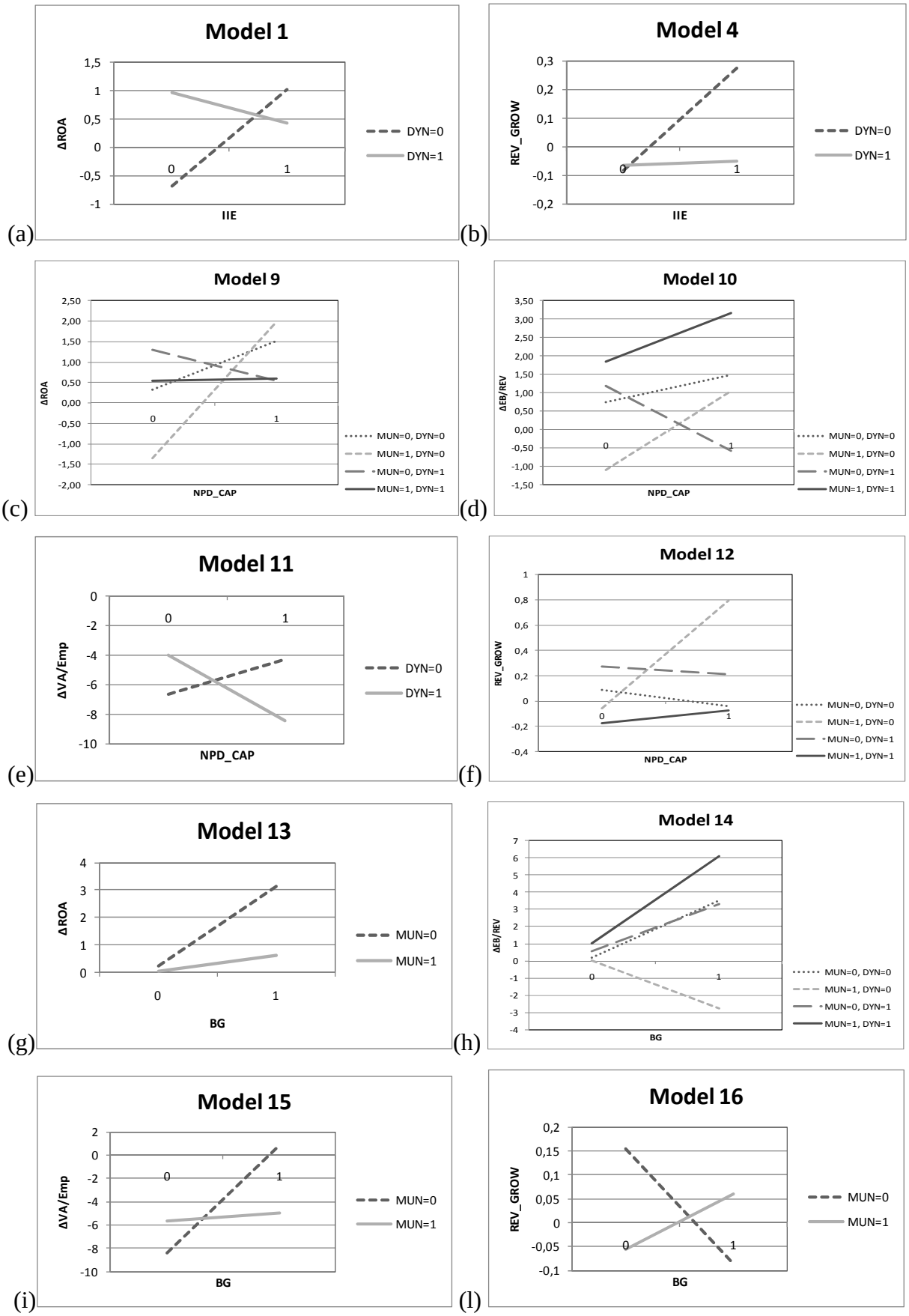
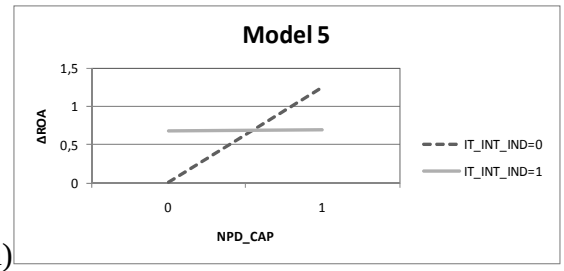


Figure 1. Capabilities, dynamism and munificence interaction on performance

(a) 

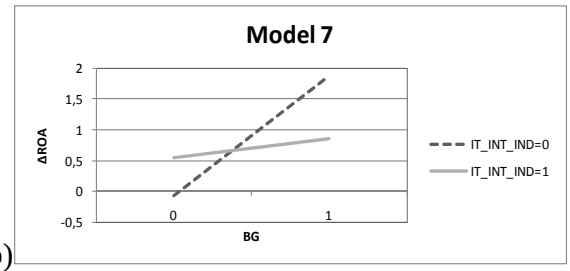
(b) 

Figure 2. Capabilities and industry type interaction on profitability differentials