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1. Introduction

In spite of the relative delay shown during the 1990s, today the Information and Communication Technology (ICT) revolution has fully involved also Italy. In the most recent years, along with the process of convergence between information and communication technologies, the national ICT industry has entered a new phase of expansion and technical innovation (Iammarino et al., 2001b). According to the European Information Technology Observatory (2001), in 2000 the Italian ICT expenditure as a percentage of GDP reached 5.5% - it was 3.9% in 1997 – against a European average of 6.3% (EITO, 2001). Following the remarkable growth of the late 1990s (almost 15% per year), the weight of the Italian ICT market in the European Union reached 12% in 2000, gaining an intermediate position between the shares of the most technologically advanced EU economies – 23% in Germany, 20% in the United Kingdom and 17% in France – and those registered in the southern part of the Union (7.5% in Spain and around 1.5% in both Portugal and Greece). Furthermore, in 2000 the ICT market growth in Italy was +14% with respect to the previous year, higher than that (13%) recorded in Western Europe (EU + EFTA countries). Different demand segments contributed to such a positive change: the outstanding growth in hardware – the PC sector grew by almost 18% in 2000 - was particularly boosted by the investments of small and medium enterprises (SMEs) and start-ups in fast-growing sectors such as telecommunications; the good performance of the ISDN market was again mainly supported by small firms; ADSL services were instead especially driven by medium-sized and large firms (EITO, 2001).

On the basis of these ongoing transformations, the first step in our research was to look at the distribution of Italian ICT activities across space, focusing on the effects of such a distribution on value added, investment and employment (see Iammarino et al., 2001a). As is well known, Italy is characterised by strong geographical polarisation and imbalances of both economic and innovative activities, which are among the sharpest in the “Europe of regions”. Indeed, one of the principal reasons underlying the lack of economic convergence of some regions towards the national and the EU average is the significant gap in technological endowments and innovation capacity. A good deal of empirical evidence has shown that the wide economic and technological

divide between the South and the Centre-North of the country has not decreased over time (see, among others, Svimez, 2001; Evangelista et al., 2002; Guerrieri and Iammarino, 2002). In this perspective, the requirements of the "knowledge-based economy" and the contribution of ICTs to economic growth are likely to affect differently regional growth rates: at present, however, it is far from clear whether these effects are leading to greater convergence or, on the contrary, to stronger territorial polarisation.

As is shown by empirical studies at the national level, ICTs enhance labour productivity through both capital deepening and total factor productivity (TFP) growth. On the one hand, the rapid decline in the prices of high-tech goods stimulates ICT investment, thus resulting in a significant capital deepening (ICT-related capital deepening). On the other hand, the technological advancement in ICT raises TFP growth in the innovating sectors (De Arcangelis et al., 2003). Thus, the development and diffusion of the new technologies give rise to benefits which go beyond those accruing to the ICT sector as such, and that may turn into increases in productivity at the macroeconomic level.

Moreover, there is also considerable evidence showing that the diffusion of the new technologies is highly spatially variable and that the externalities promoting their adoption are stronger at the regional/local level (see, for example, Baptista, 2000; Ernst et al., 2002). Yet, although time and space constraints have been increasingly reduced – if not seemingly eliminated – by the pace of technological change and globalisation processes, geography matters even more than in the past and new challenges arise from the increasing integration between "physical" and "virtual" space (Mandelli, 2001). Globalisation and ICT spread do not affect uniformly sectors, firm size classes and locations, which vary greatly in terms of access capacity, connection modalities and absorptive aptitude, possibly giving further impulse to (or helping to reduce) divergence. From preliminary evidence, the new ICT paradigm is showing peculiar features and different transmission modalities with respect to the 'old' technologies – for instance among small and medium enterprises (Iammarino et al., 2001a).

As in the case of the 'old' technologies, not all regions are expected to be on the frontier of the current paradigm, but all need to understand and adapt to the network age, build the competence to participate in it and take advantage of its increasing social and economic rewards. As recently argued (Rodriguez-Pose, 1999; Guerrieri and Iammarino, 2002) there are signs of a growing diversification of regional disparities, which is generating a sort of 'patchwork' in the patterns of socio-economic development within the EU: the subnational dimension thus appears to be

increasingly meaningful in terms of public policy in the area, even more so in view of its imminent enlargement towards central and eastern Europe.

This paper aims at providing a further step towards a more in-depth examination of the role of ICT on both the overall Italian economic growth and regional differentials. Given the crucial distinction between *production* and *use* of ICT - and its implications in terms of productivity measurement - it is necessary to highlight that the present work focuses on labour productivity in ICT-producing firms by region and in relation to investment expenditure. By looking at the recent trends in labour productivity in both small and medium enterprises and large firms, the attempt is to test whether a linkage may be established between ICT production and productivity levels. In the following section we briefly present the data, pointing out some measurement problems that arise when the regional dimension is taken into account. Sections 3 and 4 address the evidence coming out from the two regional data-sets considered, referring to SMEs and large firms respectively. It should be noted, however, that due to some delay in gathering and checking large firms' data, at present our analysis is mainly focused on SMEs. Section 5 concludes highlighting future research directions.

2. Data and measurement issues at the regional level

The data used in the analysis of ICT at the regional level come from two different sources. The first source is the Sample Survey of the System of Accounts of Business Units, addressed to small and medium firms (i.e. firms with less than 100 employees); the second source is the Provisional Estimate of Value Added of Enterprises, directed to large firms (i.e. those with 100 or more employees).

In order to grasp the information on the ICT industry, it was necessary to work at the level of micro data. This is the only way to identify ICT firms at the regional level according to the economic activity classification (ATECO91) based on NACE Rev.1.[1] It should be stressed that, since the data are not expanded to the population of firms of the national accounts, the two databases cannot be compared. However, even within the constraint of keeping apart SMEs and large firms, the geographical dimension of the ICT phenomenon can be outlined rather accurately for the two sets of firms. The subnational breakdown refers to the NUTS 2 level, corresponding to the 20 Italian administrative regions (see Appendix 1).

[1] The economic activity classification (ATECO 91) follows the Nace Rev.1 up to the fourth digit level, while the fifth level, that is used in the present analysis, is a further breakdown of the fourth.

According to the OECD definition (OECD, 2000) – which matches perfectly with ATECO91 - the ICT industry is subdivided in three categories of activity: manufacturing, goods-related services and intangible services (Appendix 2). As already stated, in the following we look at investment, value added and employment of SMEs and large firms producing ICT goods and intangible services.[2] As far as SMEs are concerned, the analysis is carried out with reference to the year 2000, whilst the large firms' data sets are panels, thus allowing for a comparison with previous years, covering the period 1997-2000.

The ICT phenomenon is a deep and fast technological transformation, comparable to those induced by the industrial revolution. A major drawback of such a change has been the growing complexity of the national accounts estimate arising from the necessity to grasp elements such as the speed of change, the interdependence and the intangibility of economic and innovative processes (Iammarino et al., 2002b). Nonetheless, progress has been made since the adoption, at the EU level, of the new System of National Accounts (SEC95), allowing for the resolution of some of the problems faced in the estimation of intangible activities. For example, software has been reclassified as capital good, advance has been made in the harmonisation of estimates at constant prices and, in particular for Italy, a new statistical file of productive units is now available, together with both a system for statistical surveys on the accounts of enterprises encompassing all economic activities and the first results of a few specific surveys on the most innovative sectors. Yet, it should be born in mind that the National Accounts are virtually more suitable to measure an economy with a relatively stable composition and whose output is univocally measurable through largely widespread and approved methodologies. On the other hand, greater difficulties emerge when measuring those economic activities that are generally indicated as a part of services, but actually involve also some manufacturing activities (for instance, all sectors related to electronics) whose production measurement is less obvious or whose elaboration of a specific deflator is more complex.

In the following analysis, the general problems of measuring ICT-related activities couple with those connected to the estimation of regional aggregates, which are a regional specification of the corresponding accounts of the total economy.

As far as investment is concerned, the current definition used by Eurostat describes regional gross fixed capital formation as "resident producers' acquisitions, less disposals, of fixed (tangible and intangible) assets during a given period, plus certain additions to the value of non-produced assets realized by the productive activity of producer or institutional units" (Eurostat, 1996, par.

[2] A further step in the future will certainly be to extend the analysis in order to cover also goods-related services.

3.102**)**. Therefore, the concepts of "acquisition" and "residence" are particularly relevant, as users and owners of activities may be classified in different economic sectors and, moreover, may be located in different regions. In fact, the general principle of allocating gross fixed capital formation by region is ownership (just as in the accounts of the total economy) and fixed assets owned by a multiregional unit are allocated to the local KAU (local kind-of-activity unit) where they are used (Eurostat, 1996, par. 13.20).

As a broad rule, aggregates on production activities should be allocated to the region where the unit carrying out the relevant transactions is resident (Eurostat, 1996, par. 13.19**)**. However, in the Sample Survey on small firms (1-99 employees)[3] the relevant variables are estimated assuming that the firm is located in only one region (excluding in principle multilocated firms). Therefore, the data on investment, value added and employment used in the present work are attributed to the region where the firm is resident. On the other hand, in the System of Accounts of Business Units (SABU) – covering exhaustively all firms with 100 or more employees – some regional information is available both at the level of the enterprise and, for those with more than 250 employees, at the level of the functional unit. Finally, in the Provisional Estimate of Value Added of Enterprises – which is a preliminary survey whose results are used when the information of SABU is not yet available - the data are gathered directly from the firms at the level of macro-regions (see Appendix 1) and subsequently regionalized by a weighted distributive procedure.

3. ICT and SMEs

3.1 A descriptive picture

The geographical distribution of Italian SMEs operating in the ICT sector shows, as expected, a strong concentration in the northern part of the country. As it emerges from Charts 1a and 1b, the North-west accounts for 35.8% of value added and 34.2% of employment (i.e. the total value added / employment of ICT SMEs in the country, as it results from the survey). Lombardia, in line with its role of regional 'core' of the Italian industrial innovation (Silvani et al., 1993; Iammarino et al., 1996, 1998, 1999; Evangelista et al., 2002), displays the highest shares on the national total of both ICT employment (20.1%) and value added (21.2%). The latter figures are higher than the regional contribution to non–ICT activities, where Lombardia's small firms account for 16.4% and 18.3% of employment and value added respectively. The other typical industrial centre of the North-west is

[3] Since 1998 the survey has been addressed to firms with less than 100 employees, whilst before that year it covered only the 1-19 size class.

Piemonte, which represents almost 10% of both national value added and employment in the ICT sector.

In the North-east (with 26.8% of value added and 26.1% of employment of all Italian ICT SMEs), Emilia Romagna displays the highest share of value added (9.9%), while Veneto – confirming the reinforcement of its high-tech propensity experienced since the second half of the 1990s (Ferrari et al., 2001) – leads in terms of employment (9%). It is worth to notice that the two regions of the North-east are fundamental poles of the *made in Italy*, with a large presence of small innovative firms often organised in industrial districts and specialised in the traditional strengths of the Italian industrial model (i.e. textiles and clothing, machinery and mechanical equipment, etc.). The remarkable ICT spread in the area might be interpreted also as a consequence of the wide diffusion of computer assisted production processes (CAM and CAD) and of the high degree of inter-sectoral integration along the *filiére* (usually "induced" by the district) at the local level.

SMEs active in the ICT sector located in the Centre turn out to have a similar weight on national value added and employment (around 23%). The leading region in the area is, not surprisingly, Lazio, showing shares of 8.6% and 8.3% for the two variables respectively. As a matter of fact, the region is the administrative core of the country and the relevance of the public sector in terms of demand of ICT goods and services cannot obviously be disregarded.

The eight regions of the Mezzogiorno account for 14.4% of value added and 16.4% of employment of all Italian ICT SMEs. The highest geographical concentration is that of Puglia (3.5% and 3.8% for the two indicators considered) and Campania (2.8% and 3.7%), both characterised by a relatively stronger presence of specialised local systems and innovative firms as compared to the rest of the southern area (ISTAT, 2003).

As emerges from Chart 2, Central and North-western regions are the most ICT-oriented. Indeed, the contribution of the ICT sector to the regional overall employment and value added is above the national average in Lazio, Molise and Marche in the Centre, and in Lombardia and Piemonte in the North-west. Liguria and Trentino instead are above the national figure only in terms of value added. Conversely, among the least ICT-oriented regions there are some Mezzogiorno areas (Sicilia and Calabria), but also a few North-eastern regions (Friuli and Veneto) and Toscana, whose specialization is rather of a 'made in Italy' type.

Looking at value added per employee, the first thing to note is that, in 2000, ICT SMEs turn out to have a higher labour productivity than non-ICT firms in 14 regions out of 20. On the contrary, investment per employee is relatively higher for non-ICT SMEs in almost the whole country. Charts 3a and 3b give a remarkable picture of the relative position of each region with

respect to both indicators for ICT and non-ICT SMEs respectively. First of all, the Italian Mezzogiorno is characterised by a higher intra-area differentiation in the ICT-producing sector than in all other economic activities: while in Chart 3b the whole area is below the national average in terms of productivity levels, in Charts 3a both Calabria and Basilicata are above the Italian figure. The low ICT orientation of Veneto and Friuli finds further support in the higher labour productivity of non-ICT SMEs. Lombardia is above the national average in both the ICT and non-ICT sectors: however, the value added per employee is relatively higher for non-ICT SMEs.

A further step was to check whether, having allowed for cross-sectoral variance, cross-regional variations do matter, supporting our expectation that the differentiation of per capita value added is stronger at the geographical than at the sectoral level. The results of the one-way ANOVA are reported in Table 1 with reference to the year 2000. The value of F, significant at 5% level, is evidence against H_0 of equality of all population means, implying that the sectoral variance *between* regions prevails on variance *within* them. Interestingly, the ANOVA test was performed also for 1999 and 1998[4]: the F was still significant - though at the 10% level - only in the former year.

3.2 The Logit Model

As is stated in the introduction, our principal concern is to investigate some determinants of labour productivity at the firm level, with particular attention to geographical and sectoral variables. Thus, we concentrate on the linkage between ICT production and labour productivity levels. As a matter of fact, the overall impact of ICT on growth depends on the relative weight of the ICT sector: therefore, it is clear that the contribution of technical progress in the ICT-producing sector is smaller the lower the relative weight of that sector in the economy. Furthermore, spillovers can be a side-product of technical progress in the ICT-producing sector, or of complementarities with innovations generated in other sectors: thus, given the highly localised nature of spillovers - which remain on average constrained by space (Ernst et al., 2002) -, the geographical location of ICT firms is a crucial factor for a future assessment of the impact of new technologies on economic growth.

The econometric analysis adopted is probabilistic. The model used is a logit model, since the dependent variable, being a dummy variable, has two categories. The probability of the event occurring is determined by:

$$\text{Prob}\,(Y_i = 1) = F(\alpha + \beta X_i) = \frac{\exp(\alpha + \beta X_i)}{}$$

[4] It is important to remind that the Survey on SMEs is a sample survey, thus preventing any rigorous comparison over time.

$$1 + \exp(\alpha + \beta X_i)$$

After some manipulation, we can write:

$$\log_e [\text{Prob}(Y_i = 1)/1 - \text{Prob}(Y_i = 1)] = \alpha + \beta X_i$$

The effect of a unit change in X_i on the log odds ratio of the event occurring is given by the beta coefficient. As logit models are not linear in the parameters, they were estimated by using maximum likelihood techniques. Taking into consideration the log odds ratio is very useful since the interpretation of the coefficient is immediate.

The model estimates how the independent variables affect the relative probability that the firm has a high (low) labour productivity. The dependent variable (PROD) in the two specifications of the model takes the value of 1 when the firm has a high (low) level of labour productivity, and 0 otherwise. The categories were established on the basis of quartiles, where the upper quartile defines the High Productivity variable, whilst the lower quartile identifies Low labour Productivity firms. The independent variables which may affect the probability that the firm falls into one of the two categories above are all dummies. The *geographical* dimension is considered by taking into account three macro-regions: North, Centre and South. Four *sectoral* variables (ICT, Manufacturing, Constructions and Services) were created according to the main product/service produced by the firm. The *investment* per employee has been categorised according to the same quartile procedure used in the case of productivity (High Investment, Low Investment). The last independent variable is the *firm size*, where the Micro size variable groups firms with 0-5 employees, the Small size includes firms between 6 and 19 employees, and the Medium size gathers together all firms between 20 and 99 employees.[5] Appendix 3 reports the description of the variables, both dependent and independent, used in our analysis. It should be noted that, due to the computational effort necessary to estimate the model (database size is 28,263 observations), we preferred to fit several smaller models including a reduced number of variables each time.

The results of the econometric analysis are reported in Table 2, which shows the value of the coefficients, the levels of significance measured by t statistics, the number of observations, the percentage of correct predictions on the total number of observations and the value of the likelihood function. The independent variables were introduced into the models in different groups to test whether the exclusion or the inclusion of a particular set had an effect on the significance of the

variables: all possibilities considered showed the same result. As emerges from the Table, all variables but the *firm size* are significant at the 1% level. This is a rather satisfactory result and, as the logit model is stable in the variables, at least considering the signs, it provides support for the interpretation attempted. Moreover, the number or percentage of correct predictions over the total number of observations yields a rather high correct prediction rate: 75.3% for the High Productivity model and 75.6% for that of Low Productivity.

A positive value of the coefficient of North means that the effect of a unit change in North on the log odds ratio of the event occurring - i.e. on the log of the relative probability of being a high labour productivity firm - is positive and of a magnitude equal to 0.409. In other words, the North increases significantly the relative probability of being a firm with a remarkable productivity level. As expected, South has a negative coefficient, thus indicating that the location in the Italian Mezzogiorno is likely to hamper the probability of being highly productive firms. Conversely, both the geographical dummies show the opposite sign for the Low Productivity estimation.

As far as the *sectoral* variables are concerned, being an ICT producer increases significantly the log odds ratio of having a high level of labour productivity. This seems in line with the theory, which predicts that ICT-producing sectors are those where gains in productivity are by far the most evident. Moreover, the ICT coefficient turns out to be negative and not significant in the Low Productivity specification. Services follow by and large the same pattern as the ICT sector, whilst Manufacturing as an independent variable displays a somehow weaker impact: non only the coefficient is the lowest among all significant variables, but it shows the same positive value in both specifications of the model.

The High Investment dummy raises significantly the probability that the firm is in the category of High Productivity, showing a coefficient of 0.8. On the contrary, Low Investment decreases the latter probability. This results are also supported by the outcome of the Low Productivity model.

As already highlighted, somehow surprisingly the dummies relative to *firm size* do not seem to have an impact on the likelihood that the firm falls into a particular productivity category. This might be partially due to the fact that our sample includes only SMEs (0-99 employees), thus resulting in a null size effect which might be instead evident by including larger size classes.

[5] According to the EU official definition, firms below 250 employees are classified as SMEs. However, since in the Istat classification SMEs are below 100 employees, in the present work Medium size firms are subdivided between the two datasets (20-99 in the SMEs database and 100-249 in the large firms' database).

4. ICT and large firms

In this section we briefly look at the geographical distribution of ICT large firms in the Italian regions. In 2000, the ICT sector accounted for 4.6% and 3.9% of total national value added and employment respectively (Chart 4). Abruzzo, where Texas Instruments invested massively in the late 1990s, turns out to be the most ICT-oriented region, showing the highest share of ICT on both regional value added (15.7%) and employment (16.9%). In the regional rank, Lombardia and Lazio follow: as a matter of fact, in these two regions the relative presence of very large firms is indeed remarkable. Yet, as already highlighted, Lazio is the administrative and political core of the country, thus hosting the headquarters of many national and multinational firms because of location advantages such as political lobbying and institutional linkages, as well as research centers and laboratories both private and public. Conversely, Lombardia is the Italian industrial regional centre, where the intensity of enterprise networking, the development of infrastructures and the availability of business services are amongst the most advanced. In particular, the strength of the innovative system of Milan is based on the dynamic innovation performance of some large firms, such as Alcatel, Italtel, Sgs-Thomson, Siemens Telecomunicazioni, etc., all giving a substantial contribution to the ICT industry.

The performances of ICT large firms in the Mezzogiorno area are rather heterogeneous. A part from the case of Abruzzo highlighted above, the bulk of ICT activities is strongly concentrated in Campania (4.6% and 4.2% of total regional value added and employment respectively), followed by Calabria (3% and 2.3%) and Sicilia (1.7% and 1.9%). In the latter region, the emergence of local technological poles over the 1990s has been largely due to foreign direct investment by a few multinational groups, which have given rise to some local start-ups in highly innovative sectors. This is particularly the case of Catania, where also university-industry linkages have strengthened in the second half of the 1990s – the most remarkable example is that of Co.Ri.M.Me. (Consorzio ricerca microelettronica Mezzogiorno), established at the end of the ‘80s by Sgs-Thomson - with positive effects on both employment and local specialisation patterns.

Looking at the growth rate of value added and investment per employee, Charts 5a and 5b report the percentage change for ICT and non-ICT large firms in 1999-2000. In the Mezzogiorno area, ICT firms exhibit higher rates of growth of both value added and investment per employee than non-ICT firms. As expected, Sicilian ICT firms show the highest labour productivity growth (32.8%), followed by that of Campania (24.8%) and Abruzzo (20.8%). The increasing trend of the ICT sector in South is confirmed also by the impressive rates of growth of investment per employee recorded in Calabria, Puglia and Sicilia. It is interesting to note that, even though Lombardia and

Lazio are considered the Italian New Economy poles, it is the Mezzogiorno area that, in the last five years, has recorded the highest growth rates (50% on average)[6]. This might be partly due to the incentives to technological investments granted by the Italian government to the Southern regions in the second half of the 1990s.

5. Conclusions

This preliminary analysis of the data shows territorial peculiarities which seem to support our previous work relative to the period 1997-98, and gives extremely interesting insights to the issue here explored. The work is still in progress but, to the extent to which SMEs are concerned, a first important result is that a strong linkage emerges between high labour productivity and ICT-producing sectors. This is in line with the theory, which predicts that ICT-producing sectors are those where gains in productivity are by far the most evident. Furthermore, the geographical location of firms, as expected, seems to play a crucial role in determining the level of labour productivity. However, the same analysis will be carried out also for Large Firms in order to verify the existence of a linkage between ICT production, labour productivity and geographical location and to test the independence of productivity from the *firm size*, as the results we obtained for SMEs seems to indicate.

[6] See Fita-Survey 2001.

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APPENDIX 1

THE ITALIAN NUTS 2 REGIONS

MACROREGION	REGION (NUTS 2)
NORTH-WEST	PIEMONTE
	VALLE D' AOSTA
	LOMBARDIA
	LIGURIA
NORTH-EAST	TRENTINO A.ADIGE
	FRIULI VENEZIA GIULIA
	VENETO
	EMILIA ROMAGNA
CENTRE	TOSCANA
	LAZIO
	UMBRIA
	MARCHE
SOUTH (MEZZOGIORNO)	ABRUZZI
	MOLISE
	CAMPANIA
	PUGLIA
	BASILICATA
	CALABRIA
	SICILY
	SARDINIA

APPENDIX 2

ATECO91 – THE ICT INDUSTRY (excluding goods-related services)

Manufacturing

30010 Manufacture of office and accounting machinery
30020 Manufacture of computing machinery
31300 Manufacture of insulated wires and cable
32100 Manufacture of electronic valves and tubes and other electronic components
32201 Manufacture of television and radio trasmitters
32202 Manufacture of apparatus for line telephony and line telegraphy
32203 Repairing of television and radio trasmitters and apparatus for line telephony and line telegraphy
32300 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
33201 Manufacture of instruments and appliances for measuring
33202 Manufacture of gas water and other liquids meters for measuring, checking, testing
33203 Manufacture of navigational aids, hydrological, geophysical and meteorology instruments
33204 Manufacture of instruments and appliances for other purposes, except industrial process control equipment
33205 Repairing of scientific and precision instruments (optical ones excluded)
33300 Manufacture of industrial process control equipment

Intangible services

64200 Telecommunications
72100 Hardware consultancy
72200 Software consultancy and supply
72300 Data processing
72400 Data base activities
72500 Maintenance and repair of office, accounting and computing machinery
72601 Services of telematics, robotics, computer graphics
72602 Other computer related activities

APPENDIX 3

LIST OF VARIABLES

Dependent Variable		
Labour productivity	High	1 if the firm has a high labour productivity, 0 otherwise.
	Low	1 if the firm has a low labour productivity, 0 otherwise.
	Medium	1 if the firm has a medium labour productivity, 0 otherwise.
Independent Variables		
Geographical	North	1 if the firm is located in the North, 0 otherwise.
	South	1 if the firm is located in the South, 0 otherwise.
	Centre	1 if the firm is located in the Centre, 0 otherwise.
Sector	ICT	1 if the firm is operating in the ICT sector, 0 otherwise.
	Manufacturing	1 if the firm is operating in the manufacturing sector, 0 otherwise.
	Services	1 if the firm is operating in the services sector, 0 otherwise.
	Construction	1 if the firm is operating in the construction sector, 0 otherwise.
Investment	High	1 if the firm has high investment, 0 otherwise.
	Low	1 if the firm has low investment, 0 otherwise.
Size	Micro	1 if the firm has a micro size, 0 otherwise.
	Small	1 if the firm has a small size, 0 otherwise.
	Medium	1 if the firm has a medium size, 0 otherwise.

Chart 1a - ICT SMEs: shares of value added by macroregion, 2000 (Italy=100)

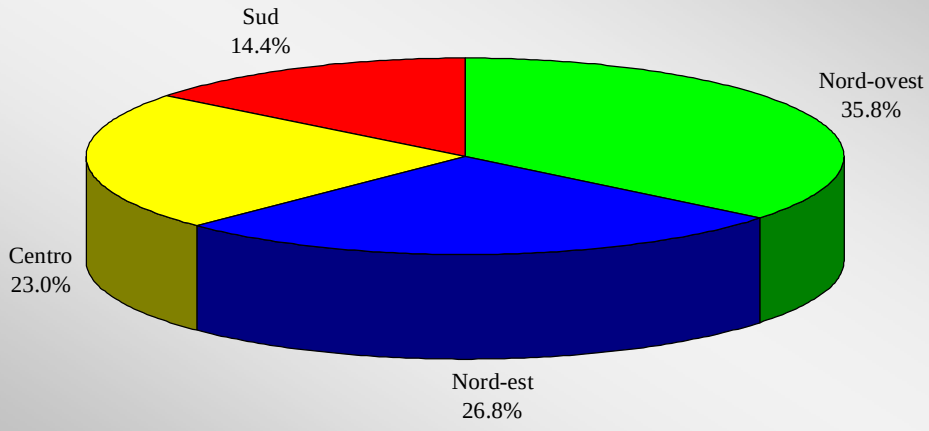

Chart 1b - ICT SMEs: shares of employment by macroregion, 2000 (Italy=100)

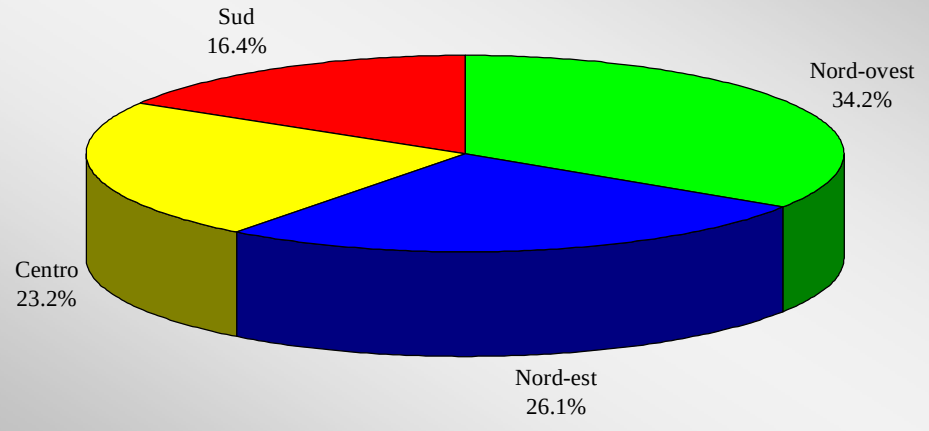

Chart 2 - SMEs: shares of ICT on total value added and employment by region, 2000

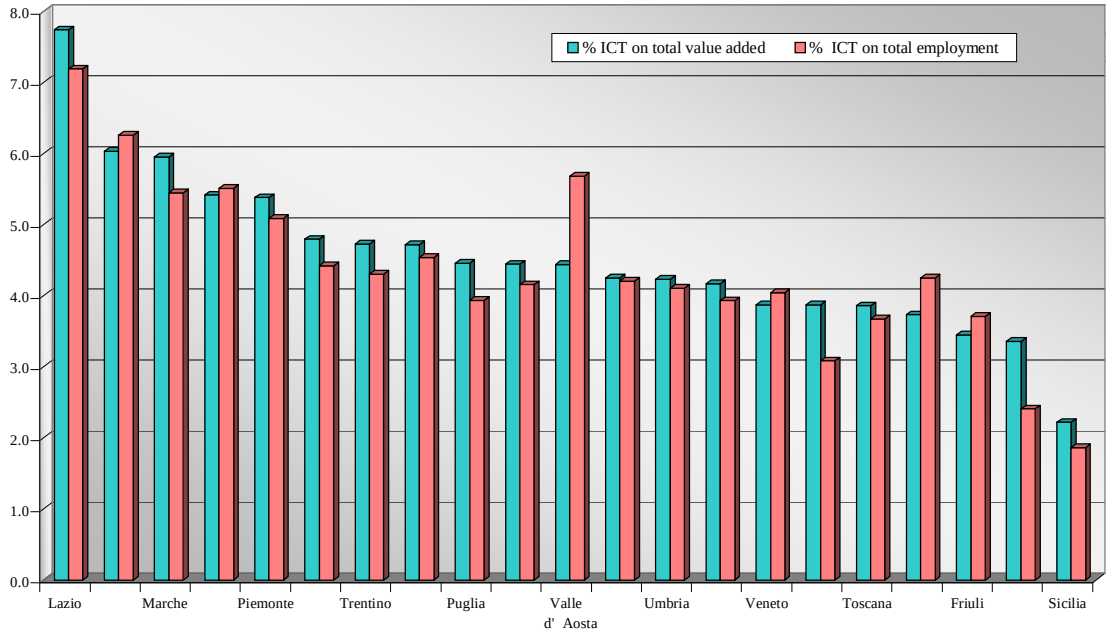

Chart 3a - ICT SMEs: value added and investment per employee, 2000

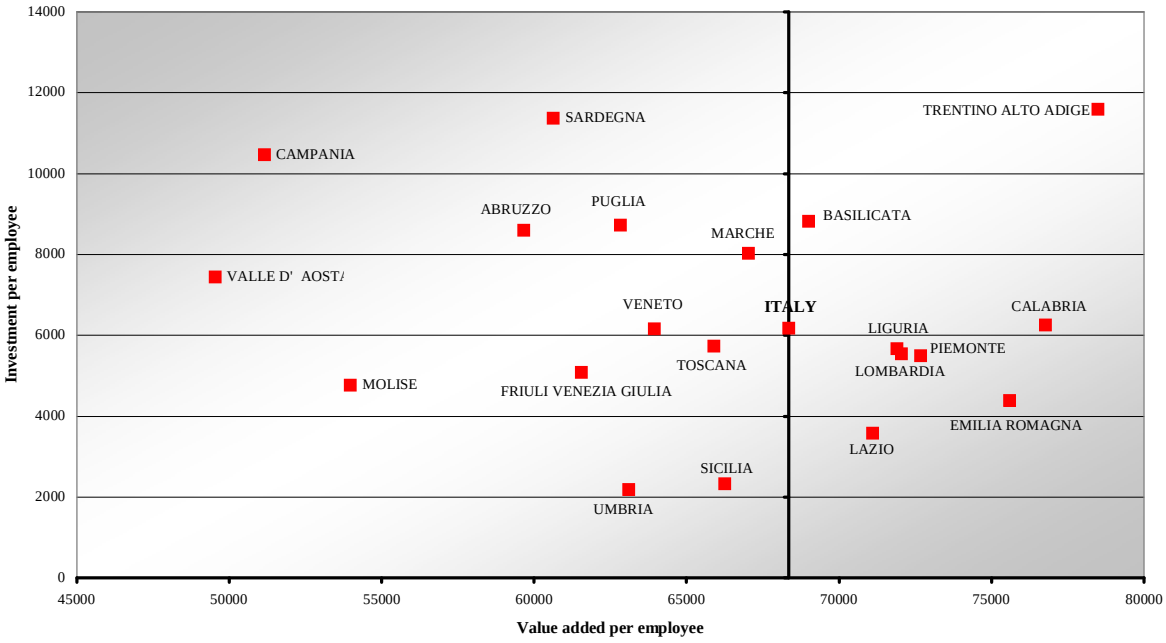

Chart 3b - non-ICT SMEs: value added and investment per employee, 2000

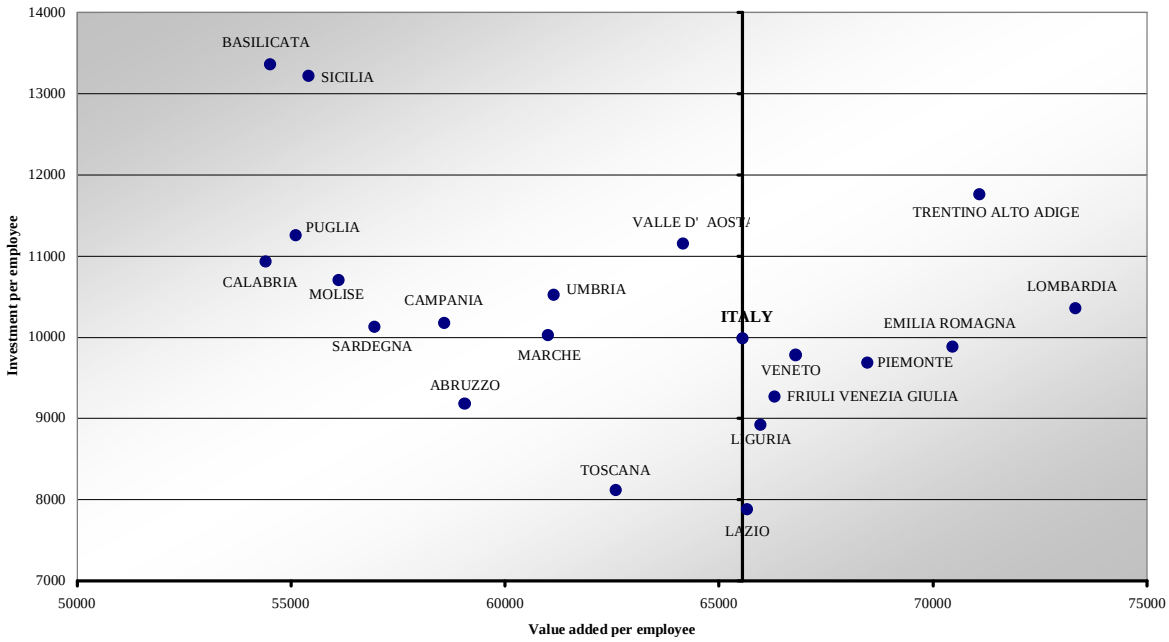

Table 1 - ONE-WAY ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11259344460	19	592597076.8	1.7877778	0.02
Within Groups	96126686623	290	331471333.2		
Total	1.07386E+11	309			

Note: Critical value of F [Prob. 0.01] for relevant degrees of freedom: 1.97; of F [Prob. 0.05]: 1.62

Table 2 – Logit Model results

	Labour Productivity	
Variable	High	Low
Constant	-1.888*** (0.082)	-1.076*** (0.074)
North	0.409*** (0.038)	-0.393*** (0.036)
South	-0.536*** (0.052)	0.552*** (0.043)
ICT	0.609*** (0.096)	-0.094 (0.092)
Manufacturing	0.218*** (0.075)	0.397*** (0.067)
Services	0.747*** (0.073)	-0.262*** (0.067)
High Investment	0.800*** (0.032)	-0.723*** (0.041)
Low Investment	-0.636*** (0.040)	0.721*** (0.032)
Micro size	-0.008 (0.032)	-0.031 (0.032)
Medium size	-0.035 (0.043)	0.035 (0.044)
Observations (A)	28263	28263
Cases correct (B)	21279	21365
% B/A	75.3%	75.6%
Log-likelihood	-14803.32	-14734.92
Pseudo-R sq.	0.077	0.082
Wald χ^2	331.261 [0.000]	454.499 [0.000]

Notes: standard errors in parentheses; *** denotes significance level at 1%; χ^2 test for the cumulative significance of sectoral dummies; [ ] p-values.

Chart 4 - Large firms: shares of ICT on total value added and employment by region, 2000

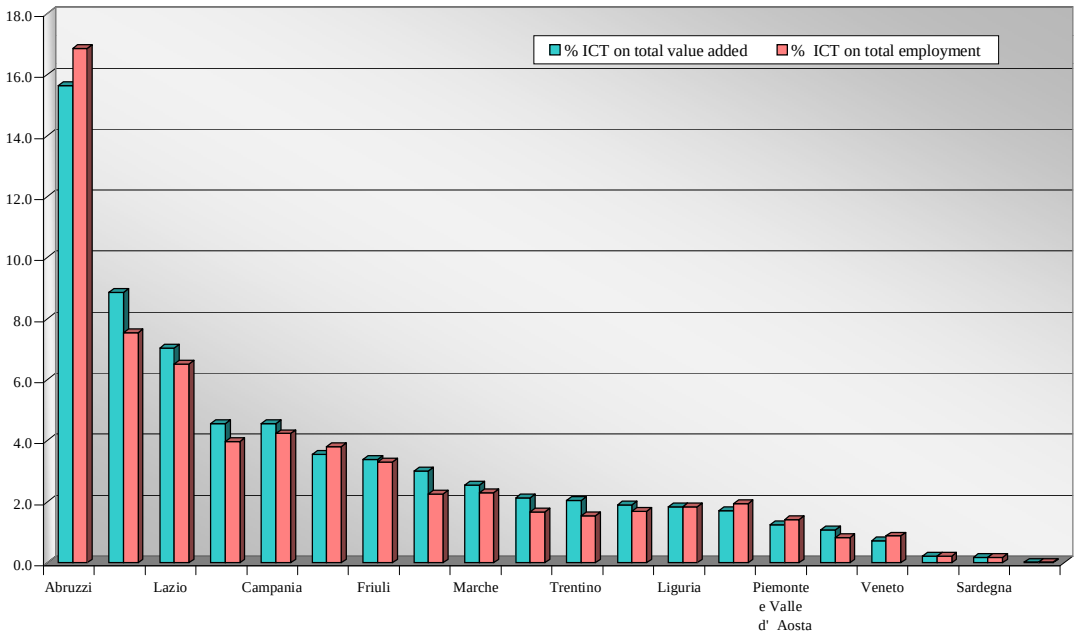

Chart 5a - ICT and NON ICT Large firms: value added per employee, 1999-2000 (percentage changes)

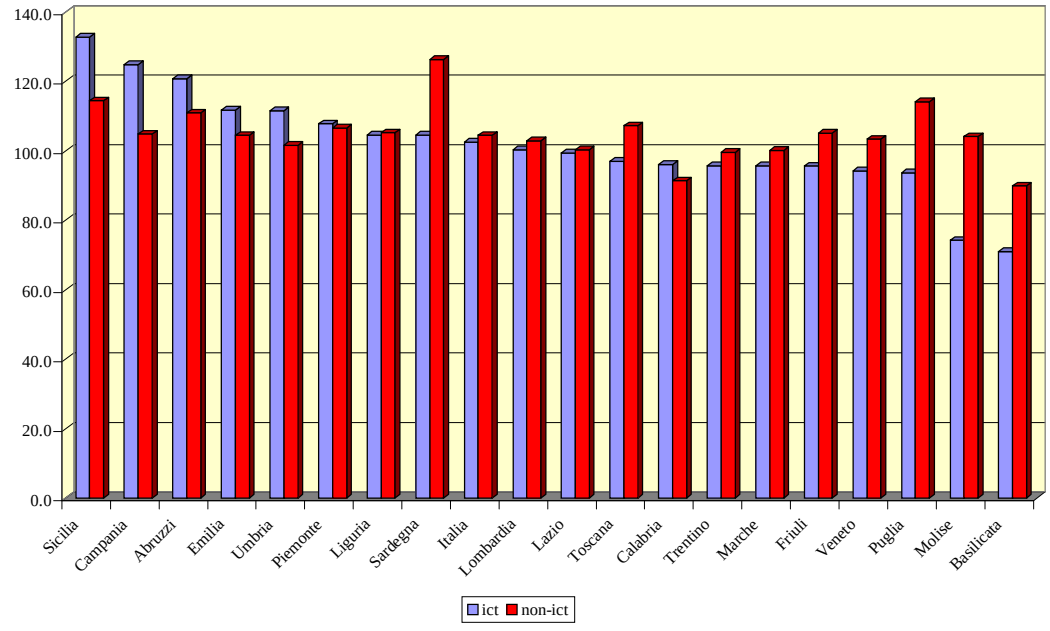

Chart 5b - ICT and NON ICT Large firms: investment per employee, 1999-2000
(percentage changes)