Industry profiles and economic performances. A firm-data based study for Italian industries.

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1. Introduction

In order to be successful in a world wide competitive environment, companies need to set up complex strategies exploiting different firms' characteristics.

The role of entrepreneurs and managers, labour force' skills and talent, investments and internationalization strategies are crucial for a successful firm in manufacturing and services products of high quality. This set of heterogeneous characteristics can be broadly defined as firms' managerial practise.

Recently, the empirical economic literature has focused on the role of managerial practise in fostering firms' performance. Managerial practices are related to in either physical or human capital and to organization, good management and entrepreneurship (Audretsch et al., 2006). Relationship among organizational factors, innovative output and differences in small and large firms: non financial performance measures, innovative managerial practises, workers' skill and training are key aspects of market competition. Managerial practises are strongly associated with firm level productivity and play a significant cross-country role in markets competition (Bloom and Van Reenen, 2007).

In this paper, we analyze the performance of Italian firms, accounting the firm's specific characteristics and its decisions in terms of investment and innovation, and organizational capabilities: human capital and firm's internationalization strategies. Namely a PC (Principal Component) analysis is carried out in order to describe the framework environment of Italian enterprises between 1993 and 2007, and a regression model is estimated in order to detect the relationship between the current firm level productivity and a set of indicators representing human capital characteristics, organization capability, investment in a previous period.

2. Methodology

2.1 Classification and indicators

According to its main economic activity, each firm is originally associated with an industry defined within the ATECO classification, which is a disaggregated version of the EUROSTAT NACE, Rev. 1 industry classification. In order to facilitate a high comparability at the international level of our results, industries are redefined according to the classification adopted with the purpose of detect the High Technology (HT) intensity sectors for manufacturing and Knowledge Intensity Sectors (KIS) for services. This classification is designed to take into account the technology intensity and/or trade sensitivity of sectoral production activities.

For the purposes of our analysis, the technology-based criterion is of particular importance, the aim of the paper is to evidence the behaviour of enterprises having different technological intensity in terms of wage levels, production orientation, skill levels and productivity. So an HT-KIS classification is adopted in order to carry out the following elaboration. In Table l is presented the HT-KIS classification level adopted

Table 1. HT-KIS classification

Description	**Label**	**NACE Rev.1.1 Sectors**
High – tech manufacturing	MA_HIGH_TEC	30,32 and 33
Medium high - tech manufacturing	MA_MHIGH_TEC	24,29,31,34,35
Medium low - tech manufacturing	MA_MLOW_TEC	23,25 to 28
Low – tech manufacturing	MA_LOW_TEC	15 to 22,37,36
Knowledge Intensive high - tech Services	SE_KIS_HT	64,72,73
Knowledge Intensive market services (excluding high - tech and financial services)	SE_KIS_MS	61,62,70,71,74
Other Knowledge Intensive Services	SE_KIS_OT	80,85,92
Low-Knowledge Intensive market Services	SE_LKIS_MS	50 to 52,55,60,63

We considered a set of indicators concerning: the economic management, the *entrepreneurships*, and enterprises performances in order to analyze the companies behaviour during the period. The data for the sector Other Knowledge Intensive Services were not collected in 1993 and so it is not presented for that year.

In order to recognize the productivity and profitability path of the Italian firms and their competitive advantage, it firstly needs to consider, in a unique framework: the productivity ratios, the profitability ratios and the company organizational conditions. Secondly it needs to assess, in the same framework, the companies' international competitiveness level (measured by the share of exported turnover on total turnover) and the tendency to invest (measured by average investment per head)

The profitability ratios measure how well a company is performing given that they measure the company ability to achieve a minimum profit share level, after covering costs. We used such a ratios in order to assess the companies economic position.

We considered firstly the value added on number persons employed ratio (Value added per persons employed) as indicator of labour productivity; after we analysed three important profitability ratios: firstly the profits on total assets ratio (prof_t), secondly the GOS (gross operating surplus)[1] on value added ratio, and finally NOS (net operating surplus) on turnover.

As organizational indicators we considered the white collar (cwtot) and blue collar (bwtot) labour cost incidence on total labour cost, the compensations for unit of labour (pcul) and for unit of product (pcup) and finally the white collar to total employee ratio (wemp), these indicators measure both the incidence of skilled workers and the labour intensive nature of an economic sector. All indicators are listed in the following Table 2.

[1] In English it is also called EBITDA (Earnings before Interests, Taxes, Depreciations and Amortizations).

Table 2. Indicators and ratios utilised in the analysis

PRODUCTIVITY AND PROFITABILITY INDICATORS	
INDICATORS	**DEFINITIONS**
Prof2	*NOS on value added*
Prod (labour productivity)	*Value added on number persons employed*
Prof1 (profit margin)	*GOS on value added*
Prof_t (profits on turnover)	*Profits on turnover*
ORGANIZATIONAL INDICATORS	
INDICATORS	**DEFINITIONS**
Cwtot (white collar labour cost incidence)	*White collar labour cost total labour cost*
Cbtot (blue collar labour cost incidence)	*Blue collar labour cost total labour cost*
Pcul (wage and salaries for unit of labour)	*Wage and salaries on employees number*
Pcup (wage and salaries for unit of product)	*Wage and salaries on turnover*
Wemp	*White collar to total employee ratio*
OTHER INDICATORS	
Exp_t (export tendency)	*Export turnover on total turnover*
Invpe (investment per head)	*Investment on number of persons employed*

We calculated ratios according to the classification of economic activity HT-KIS described above. Furthermore we considered the persons employed number as a company size related variable.

2.2 Principal components methodology

The Principal component analysis is a multivariate technique for examining relationships among several quantitative variables (J.Johnston and J. Di Nardo, 1997). The principal component analysis is a factorial method which can be used in order to detect a linear (latent) relationship as well as in order to reduce the number of variables in regression, clustering and so on. More precisely, such analysis is concerned with explaining the variance-covariance structure of the chosen variables through a few linear combinations of them. In the present context it is aimed at data reduction so as to allow the identification and interpretation of the first two factorial axes.

Given a matrix X with n observations, 8 HT-KIS sectors, k numeric variables, 11 indexes described above, we can compute k principal components. Each principal component is a linear combination of the original variables

In geometric terms, the j-dimensional linear subspace spanned by the first j principal components gives the best possible fit to the data points as measured by the sum of squared perpendicular distance from each data point to the subspace.

When a PCA is applied a problem of interpretation of factor can arise.

The problem is assigning to each principal component a name which reflects the importance of the component in predicting each of the observed variables, that is, the coefficients in the pattern matrix corresponding to each component.

In order to facilitate the components' interpretation process, we rotate the principal components, by applying a non singular linear transformation given that analysis of a rotated pattern matrix in which all coefficients are close to 0 or +/- is easier than the analysis of the original matrix that contains many intermediate elements.

As previously stated all principal components are uncorrelated with each other. If the components are rotated by an orthogonal transformation, the rotated components are uncorrelated too. In this analysis we use a Varimax orthogonal rotation in order to better understand the components.

To analyse the variables' dynamic on two or more time periods in a PCA, "Multiway" technique is the best methodology (Coppi, 1998; Blanco and Coppi, 1999). However, in order to obtain sufficiently robust estimations using such a methodology, we need a 20 times observation series, while in our case cause a sufficiently long time series was not available for all variables. More specifically, the need for more than two times is due to the rationale of the Multiway technique, which is based on a particular decomposition of the total variability: the variability within groups on one side (where the groups are represented by the different times) and the variability between groups (i.e. due to time). This second part is modelled through a linear regression model where the different times represent the observations of the covariate. It is then clear that three times only are completely inadequate to allow the regression model to be estimated and work properly.

Thus, we propose a technique based on principal components which enables to define a "compromise plan" to perform a joint analysis of 1993, 1997 and 2007 data.

We have the same units, the same variables and two different times. We can define at the first level two different matrices for years 1993 and 1997, say X' and X''; then we compute a new variable 'time' when we flag the different "time place", i.e. a variable which assumes the value zero for the 1993 observations and the value one for the 1997 ones, and this work is repeated for year 2007 observations matrix *X'''*. Finally, we append the third matrix *X'''* and the second matrix X'' to the first X' after having completed all of them with a further column containing the values of the new flag variable. In this way we obtain only one matrix with units, variables and times having *3n* rows and $k+1$ columns.

Starting from this new matrix, a standard Principal Component Analysis can be carried out jointly for the datasets related to different years instead of three separate analysis. Thus the observation scores calculated for both years can be displayed on the same factorial space (Mariani and Lacangellera, 2005, Zeli and Mariani, 2009) with the same components.

We define this way to analyse data "compromise" because it uses only the Principal Component Analysis, in order to synthesise the information represented in the set of indicators, with different times.

2.3 Regression model

Our study is also intended to formalise a relation between the current value of productivity and the past values of a large set of firm characteristics such as: investment, innovation, organisational capabilities, human capital and firm's internationalization strategies. The variables taken in account for the paper may be divided in two groups: the first group includes variables related to human capital, structure of the firm employment, skilled and no skilled employees, these variables detect the "structure" of the firm, the second group of variables are more related to "performance" of the firm profitability, exportation tendency and so on this kind of variables are more influenced by short terms economic framework.

This analysis is implemented by the estimation of the following model:

$$1) \quad {}_j\text{prod}_{t+1} = a + \beta_{2\ j}\,\text{prof1}_t + \beta_{3\ j}\,\text{prof2}_t + \beta_{4\ j}\,\text{prof\_t}_t + \beta_{5\ j}\,\text{exp\_t}_t + \beta_{6\ j}\,\text{pcul}_t + \beta_{7\ j}\,\text{pcup}_t$$

$$+ \beta_{2\ j}\,\text{invpe}_t + \beta_{3\ j}\,\text{prod}_t + \beta_{4\ j}\,\text{wemp}_t + \beta_{5\ j}\,\text{cwtot}_t + \beta_{5\ j}\,\text{cbtot}_t + \varepsilon$$

j=1,..,8 HT_KIS sectors
t=1993, 1997

Where $_j prod_{t+1}$ is the value added per head calculated for the period t+1, the independent variables labels are described above. In order to take in account the change at firm level we take out, for the regression of year 1997 productivity level on 1993 characteristic, a panel of 18,465 firms. For the regression of year 2007 productivity level on 1997 characteristic we realize a more tiny panel which includes 6,705 firms. The regression is repeated for each HT-KIS sectors.

3. The Database

IDB (Integrates DataBase) is an integrated system of data (Grazzi, Sanzo, Secchi and Zeli, 2009) as it embeds information coming from different sources (as described below). As a first rough picture, consider that IDB is built on the backbone of the already existing census of Italian firms operated by ISTAT. On this backbone we "insert" observations coming from other sources to limit possible missing values. In particular, ISTAT resorts, after careful cleaning and controls, to financial statements to fill in the missing values in its census (Biffignandi, Nascia, and Zeli, 2009). In addition, it has also been possible to enrich the database linking to the existing observations other variables concerning export behaviour, and innovation activity.

As such IDB offers the researcher a powerful instrument to investigate the dynamics of the Italian industry in the period, 1989-2007. In particular, IDB combines the features of rich cross-sectional information together with the availability of long enough time series. Given the criteria that led the collection of data, the very nature of IDB is a series of cross-sections bound together.

IDB resorts to three different sources of data: the census of Italian firms, (in Italian "Sistema dei Conti delle Imprese", SCI), SCI, the survey that covers small and medium enterprises, PMI (small and medium enterprises sample survey), and annual reports of incorporated firms. These database are described in the following.

The main source of data is the census of Italian firms, also known as SCI census. SCI is a detailed survey on economic and financial accounts of enterprises and it is carried out annually in Italy by ISTAT. This questionnaire was sent to all firms bigger than 20 employees. We could access to data starting from 1989. As it will become clearer in the following, from 1998 onwards there has been a change, and now the census is sent only to firms with more than 100 employees. Also consider that the structure of the census as well as some of its questions did change over time in order to provide a constantly updated picture.

The way ISTAT has chosen to monitor the firms with employment in the range 20-100 is with a "rotating" survey. Information for firms with less than 100 person employed, is made available by PMI: a yearly sample survey on economic and financial accounts. Further, the PMI questionnaire only contains a subsample of the variables appearing in the income statement; and it does not contains variables from the balance sheet.

SCI and PMI collect data concerning profit-and-loss accounts and balance sheets. Information regarding employment, investment, personnel costs and some regional items is also collected. Even if the data collection has the purpose of the full coverage of the total population (or of the sample) of target enterprises there is a problem of non responses that has to be treated through missing data imputation procedures. Economic information requested by SCI and PMI meets the requirements of guidelines of the 4th EEC Directive scheme (Istat, 2007).

The data of a large share of non respondent firms or even non included in the sample if they had less than 100 persons employed (after 1998) are integrated by means the third source of data: annual report (i.e. balance sheets coming from Ce.Bi "Centrale dei Bilanci").

Indeed, Italian law prescribes that all limited liability firms have to hand in a copy of their annual report to the local Chamber of Commerce. Then Ce.Bi collects and performs some controls on the annual report of Italian incorporated firms. This source has become relatively more important for its weight in the number of observations in IDB after that small and medium firms (PMI) are monitored only by means of a rotating survey

Not all labour linked variables are available for all observations in each year, because they are not included in the Ce.Bi. database, so we take out only three years from the IDB (1993, 1997 and 2007), these years supply both the wider cross-section data availability and the wider longitudinal coverage. All variables are measured in monetary values at current prices. Final data are obtained by deflation using the indexes of producer prices at industry level and they are expressed in monetary values in euros at constant prices prevailing during the year 2000

4. Results

Average values for ratios and indicators of performance variables calculated by year (Table 3) show an increase of the performance variables of enterprise (profitability and productivity) during the Nineties and a stagnation or a decrease in the first decade of the century. The exportation tendency and investment show, instead, an opposite trend.

Table 3. Average values and main ratios - Years 1993-1997-2007

year	exp_t	pcul	pcup	invpe	wemp	cwtot	cbtot	prof_t	prof1	prof2	prod
1993	0.165	22.483	0.126	8.899	0.379	0.473	0.512	-0.019	0.290	0.018	46.836
1997	0.129	23.043	0.111	6.641	0.420	0.514	0.472	0.006	0.368	0.032	50.173
2007	0.194	23.521	0.104	10.139	0.482	0.596	0.385	0.013	0.360	0.027	50.986

The variables related to the structure of human capital and organisational behaviours register a constant improvement over the two period considered here. The *pcul* registers an increment, this indicates the engagement of more skilled personnel, the *pcup* registers a decrease, this indicates better processes management, *cwtot* and *cbtot* present an opposite trend it means that there is, in the period, an accelerated shift of the economy from the secondary sectors to the tertiary sector.

4.1 PCA results

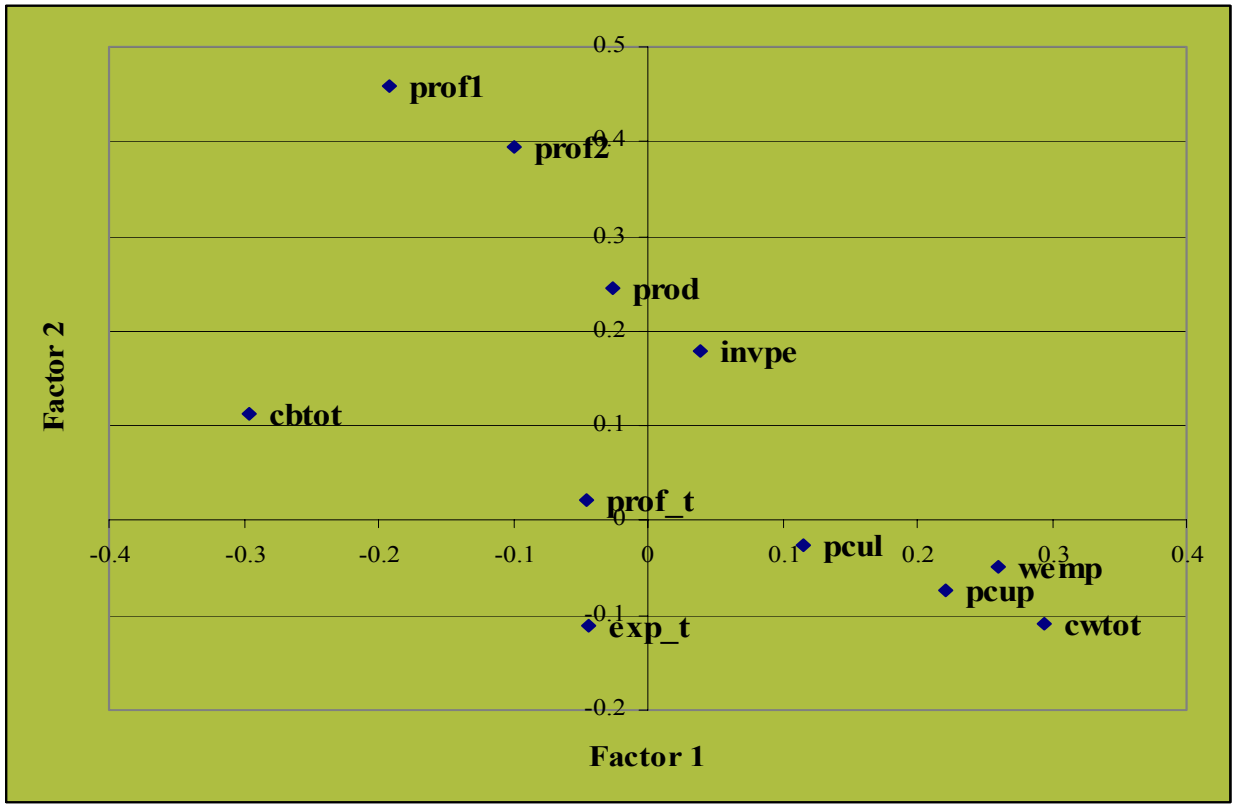
We identified the first two factors based on the correlation with the original variables. Using the factorial scores we obtained economic sectors rankings according to the two principal factors and we compare their structure in 1993 and 1997 as well as in 2007.

The first two factorial axis detected by PCA represent around the 60,0% of the total variability. The first axis represents a share of total variance equal to 39,6% and it shows an opposition between blue collars, persons employed and export tendency on the negative side, and white collars, high labour cost for unit of product on the positive side, in other word the first axis represents an opposition between industry and services.

The second axis represents a share of total variance equal to 20,2% and it is positively related to productivity indexes (value added per hour) and, above all, to higher value profitability indicators; it is also related significantly to profitability (GOS on value added ratio). Thus we interpret the second principal component as "profitability-productivity".

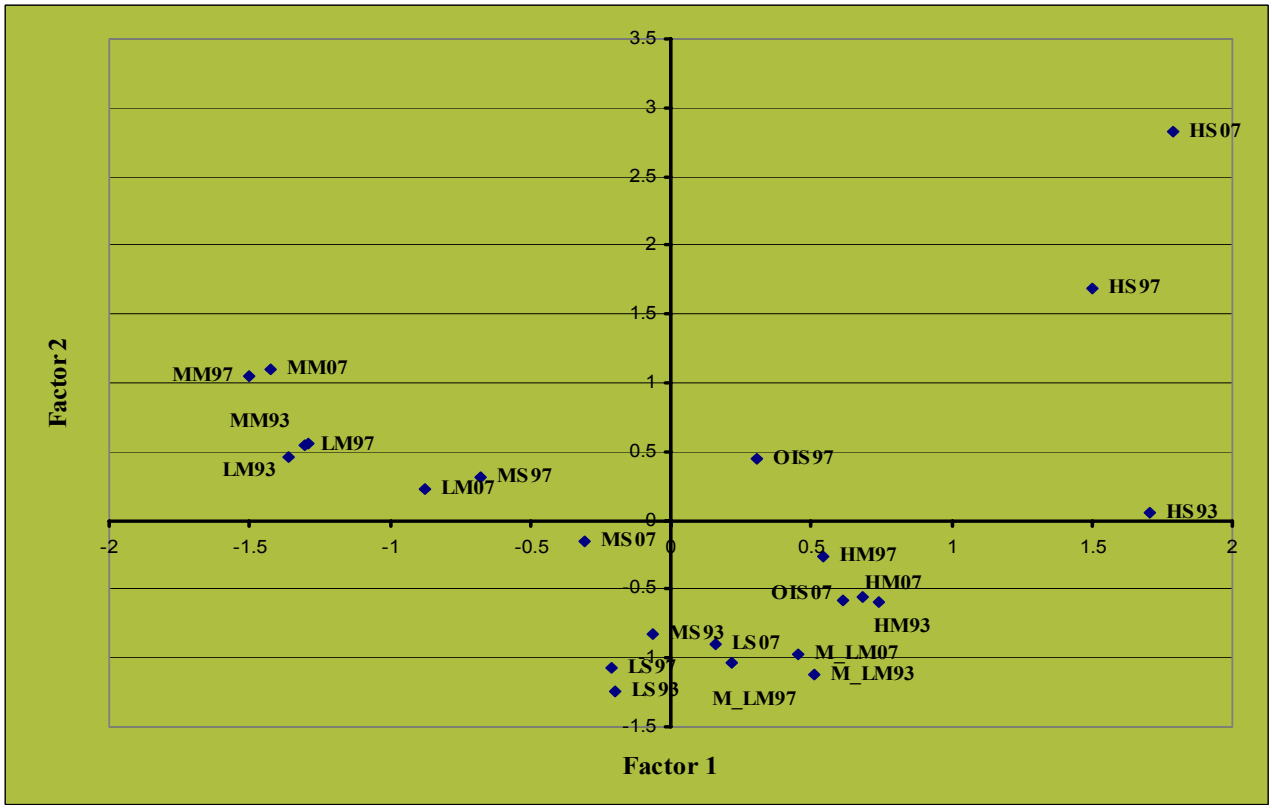
In figure 1 is shown the first principal plan created by the two first principal components.

Figure 1. First Principal plan (variables)



In figure 2 is shown the first principal plan created by the two first principal components with the "individual" (HT_KIS sector * year). As noted in the PC variables analysis above the services sector are crowded in right part of the graphic while the manufacturing are located in left side.

Figure 2. First Principal plan (individuals)



The dynamic highlights a growth in productivity and profitability between 1993 and 1997 while for all sectors there is a decrease of performances indicators between 1997 and 2007 consistent with the stagnation

(o slight decrease) of Italian productivity in the last decade (Matilde, Milana and Serrano, 2008; Milana, Nascia and Zeli forthcoming).

It can be noted the behaviour of high tech services that have a dramatic increase of the profitability-productivity index between 1993 and 1997 with little modifications between 1993 and 2007. This sectors demonstrate a great reactivity to the ICT economy explosion of the Nineties and they resisted in a better way to the productivity slowdown of first year of the century.

For the other 7 sectors, detected by HT-KIS classification, the paths in the period are very similar, a growth in profitability-productivity in the first period (1993-1997) and a decrease in the following decade (until 2007) with a change of composition of labour force. There is an increase both of white collar share on employees and their compensation on total personnel costs.

The results of the OLS regression model implemented for verify the relationship between the value of productivity in 1997 on the 1993 values of firm characteristics are presented in Table 4.

Table 4. Regressions of 1997 labour productivity on 1993 firms characteristics

	prof1	prof2	prof_t	exp_t	pcul	pcup	invpe	prod	wemp	cwtot	cbtot	*Adj* R^2	Number of observations
Total													
Parameter estimate	0.287	1.078	1.348	-0.002	0.647	-4.255	0.129	0.488	-19.16	29.78	7.105		
Pr >|t|	0.4048	0.057 *	0.2364	0.853	<.0001 **	<.0001 **	<.0001 **	<.0001 **	<.0001 **	<.0001 **	<.0001 **	82.8	18,465
MA_HIGH_TEC													
Parameter estimate	-1.0364	-26.667	62.735	2.3243	0.48759	-7.1493	-0.0428	0.625	-29.1	38.63	6.8278		
Pr >|t|	0.9286	0.321	0.0131 *	0.5681	0.0947 *	0.5449	0.7858	<.0001 **	0.076 *	0.023 *	0.2443	85.4	450
MA_MHIGH_TEC													
Parameter estimate	-0.2895	-4.4872	-3.0351	-1.0971	0.43926	-14.062	0.2894	0.47198	-5.128	33.61	15.313		
Pr >|t|	0.7227	0.4553	0.544	0.4661	<.0001 **	0.0006 **	<.0001 **	<.0001 **	0.371	<.0001 **	<.0001 **	88.4	2,983
MA_MLOW_TEC													
Parameter estimate	2.4308	-28.674	11.328	-2.4882	0.70617	-12.987	0.088	0.55946	2.427	15	8.1386		
Pr >|t|	0.0025 **	<.0001 **	0.0904 *	0.0584 *	<.0001 **	0.0007 **	0.0002 *	<.0001 **	0.674	0.002 *	<.0001 **	90.4	3,380
MA_LOW_TEC													
Parameter estimate	-0.615	-19.483	9.0615	-3.1478	0.54633	-13.287	0.0041	0.61729	-11.52	18.75	8.4795		
Pr >|t|	0.203	0.0007 **	0.1023	0.0045 **	<.0001 **	<.0001 **	0.8776	<.0001 **	0.027 *	<.0001 **	<.0001 **	84.3	4,704
SE_KIS_HT													
Parameter estimate	-7.7731	-35.036	64.377	-45.088	1.09808	-27.963	0.6536	0.32919	21.01	-8.305	19.656		
Pr >|t|	0.5866	0.0922 *	0.0012 **	0.8524	0.0007 **	0.0142 *	0.0003 **	0.0161 *	0.663	0.863	0.027 *	86.2	286
SE_KIS_MS													
Parameter estimate	0.8686	20.985	7.1056	-3.8736	0.71532	-15.432	0.0991	0.43699	-26.65	40.88	5.8466		
Pr >|t|	0.6893	0.0333 *	0.0583 *	0.7896	<.0001 **	0.0116 *	<.0001 **	<.0001 **	0.081 *	0.008 **	0.1208	79.1	808
SE_LKIS_MS													
Parameter estimate	-0.7726	5.5923	-4.2378	-0.0017	0.75004	-1.27	0.0922	0.45296	2.943	5.546	2.281		
Pr >|t|	0.4319	0.0893 *	0.2266	0.8944	<.0001 **	0.4099	<.0001 **	<.0001 **	0.671	0.412	0.1187	75.4	4,066

* 10 per cent significance ** 1 per cent significance

For the general estimate of all economy 18,465 observations are taken in account. The coefficients are significant for most part of the variables, so an influence of 1993 values of the independent variables on the 1997 level of productivity is proved.

It can be noted that the current "structural" variables are more linked to the performances of the following with respect the current performance variables. In particular the investment have a strong positive influence on the future performances as well as the average personnel costs both in general (*pcul* =personnel costs per unit of labour) and in terms of white and blue collar (*cwtot* and *cbtot*). It indicates that an high level of skill (both for white collar and for blue collar) implies in the future a good performance in terms of productivity. The low significance for performance variables is, probably, due to link between this kind of variables and the short terms economic cycle. The model fits good with an adjusted R^2 equal to 82.8.

The regression carried out by HT-KIS sectors highlights for High Technological services the influence of high skilled persons employed (*pcul* indicator), very important were the investment done in previous period and the skilled (with higher compensation) blue collar. In the middle of Nineties the telecommunication firms needed high skilled blue collar in order to improve their web in terms of hardware. The same pattern may be recognised for High Tech manufacturing sectors, for these sectors it is very important, in order to have an higher productivity in the future, to engage high skilled person employed (*pcul* indicator) and high skilled white collar (*cwtot*) but not generically white collars (negative sign of the *wemp* coefficient).

For the Low Tech sector in manufacturing the influence of the structural variables are the same and even greater, the coefficient of *cwtot cbtot* and *pcul* are positive and highly significant.

The results of the regression of value of productivity in 2007 on the 1997 values of firm characteristics are presented in Table 5.

Table 5. Regressions of 2007 labour productivity on 1997 firms characteristics

	prof1	prof2	prof_t	exp_t	pcul	pcup	invpe	prod	wemp	cwtot	cbtot	*Adj* R^2	Number of observation
Total													
Parameter estimate	-0.57397	-5.25091	-0.49276	0.23028	0.95638	0.76707	0.1761	0.29517	-0.93999	24.6634	9.11193		
Pr >|t|	0.245	<.0001 **	0.3809	0.2395	<.0001 **	0.0003 **	<.0001 **	<.0001 **	0.8172	<.0001 **	<.0001 **	67.1	6,705
MA_HIGH_TEC													
Parameter estimate	4.75572	81.703	-101.808	-2.8722	1.6745	35.3226	0.19346	0.08789	10.6435	0.44747	-8.618		
Pr >|t|	0.7092	0.1712	0.1013	0.7242	0.0072 **	0.252	0.3647	0.6348	0.545	0.9803	0.4231	78.6	201
MA_MHIGH_TEC													
Parameter estimate	-1.74791	-48.7788	46.1951	0.27086	0.1546	-8.04183	0.10874	0.57609	-5.19673	41.7013	19.3682		
Pr >|t|	0.6301	0.0006 **	0.065 *	0.8322	0.6457	0.5965	0.4699	<.0001 **	0.7305	0.0044 **	0.003 **	63.1	1,192
MA_MLOW_TEC													
Parameter estimate	-1.01517	-9.27202	61.8605	0.63859	1.24925	-19.3609	0.15337	0.14786	20.9146	17.5523	16.1733		
Pr >|t|	0.5366	0.2984	0.0003 **	0.4838	<.0001 **	0.0006 **	0.0458 *	<.0001 **	0.1066	0.1034	<.0001 **	77.8	1,138
MA_LOW_TEC													
Parameter estimate	0.48499	-20.3894	-0.21317	-0.19505	0.46571	-6.83375	0.18821	0.64008	22.2764	6.81646	4.19227		
Pr >|t|	0.6246	<.0001 **	0.9847	0.2817	0.0061 **	0.2656	0.0043 **	<.0001 **	0.0038 **	0.3201	0.1237	78.4	1,375
SE_KIS_HT													
Parameter estimate	45.1304	27.5928	-45.0458	-122.933	1.0754	-2.40366	-0.31291	0.26393	21.3061	-14.9575	-2.46011		
Pr >|t|	0.0002 **	0.2878	0.0649 *	0.0264 *	0.004 **	0.4476	0.2458	0.0796 *	0.375	0.5494	0.8852	87.3	136
SE_KIS_MS													
Parameter estimate	-31.5753	23.0806	-10.2131	2.37012	0.73959	2.08735	-0.18891	0.6814	-4.13468	9.67909	-3.44309		
Pr >|t|	<.0001 **	0.0017 **	0.3556	0.7314	0.0002 **	0.5594	0.0246 *	<.0001 **	0.7548	0.4701	0.3984	69.4	464
SE_KIS_OT													
Parameter estimate	4.55864	-7.88463	20.8562	-4627.69	2.09595	-22.0748	0.86878	-0.04028	7.17401	-3.3866	1.11083		
Pr >|t|	0.5734	0.3384	0.2382	0.3669	<.0001 **	0.1563	0.0049 **	0.0277 *	0.5981	0.8285	0.9192	57	318
SE_LKIS_MS													
Parameter estimate	-0.4014	-10.0906	7.75433	2.17539	0.37756	-1.14082	0.06411	0.52342	8.58823	17.7933	6.00626		
Pr >|t|	0.4881	<.0001 **	0.1395	0.0005 **	0.0004 **	0.6725	0.2013	<.0001 **	0.2329	0.008 **	0.0227 *	71.1	1,482

* 10 per cent significance ** 1 per cent significance

For the general estimate of all economy 6,705 observations are considered, the linked firms decreased because of the longer period considered. Also in this case the coefficients are quite all significant, so there is an influence of 1997 values of the independent variables on the 2007 level of productivity.

The regression for the total economy presents the same pattern of 1993-1997 regression, the structural variables are more significant than performance variables. In particular we have to note the level and the sign of *cwtot* and *cbtot* that represent the high skilled personnel in terms of its costs both for white and for blue collars.

For the High Tech services the coefficients for *cwtot* and *cbtot* do not have significance, anyway the more generic indicator *pcul* shows an high level and significance, all other KIS in the services show the same pattern. Only the Low KIS services present high values and significance for the coefficient of *cwtot* and *cwtot* and this, perhaps, indicates the beginning of an exploitation of new technology also for these kind of services (generically personal services).

For all manufacturing sectors but the Medium High-Tech sectors there is a strong significance for *pcul* and it indicates the necessity to have a skilled (with higher personnel costs) for those enterprises that in the following period want to have better performance in productivity. This implies also high values and significance for the coefficients *cwtot* or *cbtot* or both.
Only for the High-Tech manufacturing both *cwtot* and *cbtot* have not significance, it may mean that these sectors have already exploited, in the previous period, all opportunities given by a new mix of skilled personnel and now the competition is played in different ways.

5. Conclusions

The average indexes and the scores of first two principal axis presented above trace, in outline, the history of the Italian economy in the two past decades.

So the paths traced by the economic sectors on the first principal plan divide this history in two period, the first period characterised by the recovery after the early Nineties crisis while the second period is a period of productivity slowdown and, above all, a period in which firms carried out reorganisations and outsourcing.

In the first period there is a growth determined, probably, by the recovery after the crisis of the early Nineties, the firms behaviour after the 1997 can be explained by the reorganization processes occurred in order to face the increased internationally competitiveness and outsourcing, this may have caused a contraction of the profits meanwhile the productivity followed a stagnation path (Bronwyn, Lotti, and Mairesse, 2007; Milana and Zeli, 2004). The paths of the most part of the sectors on the first Principal plan suggest anyway also a strong reorganisation inside the firms that move towards a more white collar intensive production processes and towards the utilisation of more skilled personnel.

The High-Tech services show a different path, they increase their performance also over the last decade, these sectors have not to face a strong international competition because their target market are above all national. So they exploit in-depth new ICT technology (they are the ICT sectors) and do not necessitate (until 2008) of deep, expansive reorganisations.

The regression of 2007 labour productivity on 1997 variables does not show a clear effect of profitability on productivity in the following period, it seems to depend on the short terms economic cycle, there are more detectable effects for structural variables. The general results of the regression model analysed in this paper show that there is a general positive effect of generic skilled personnel on future productivity and through an increase of white collar number and through an improving of their skill (and in less measure of blue collar skill) there is the possibility of an increase of productivity as well.

The investment relationship with the future productivity is positive and they influence the productivity, above all, over a medium-short period, the regressions of 2007 productivity on 1997 independent variables have less significance for investment with respect to the regression of 1997 productivity on 1993 independent variables.

This paper highlights the importance of the person employed skill in competitiveness and it illustrates the development paths and behaviour of Italian firms (grouped by knowledge intensity process and high tech process and products) over the two last decades. The Italian firms need to continue on the path of reorganisation and investment in new technologies and human capabilities in order to have a recovery of their performances indicators.

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ABSTRACT

This paper investigates performance and entrepreneurship for Italian firms in the period 1993-2007. The authors set up performance and entrepreneurship indicators for Italian firms with 20 employed and more in the reference period and utilise the information coming from an integrated database based on data coming from SBS surveys and balance sheets. The analysis will outline the emerging trends in the Italian performance and entrepreneurship with a sectoral focus on more knowledge based sectors through the adoption of both HT and Knowledge Intensive Sectors (KIS) classifications. The analysis is aimed to detect also the dynamics within sectors by means also of entrepreneurship indicators.
In particular the following issues will be faced:

- *emerging sectors in the economic structure in terms of performance and competitiveness;*
- *diversity across sectors*
- *main transformation in the economic structure*

The paper is focused on Italian firms for years 1993-1997-20078 with 20 persons employed and more. The paper develops a suitable framework making available profiles of economic performance and entrepreneurship indicators both at firm than industry level for the reference period.
The main findings are synthesised by means of a dynamic principal component analysis that will be useful to catch up the more relevant industry changes. Through a regression analysis of the determinants of performance and entrepreneurship was possible to stress the emerging trends across industries and across time in the firm structure.