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An Empirical Analysis to investigate on High Growth definition

Abstract

In recent years, the political and academic interest in entrepreneurship and its determinants is grown. Policy makers give more importance to the development of high growth enterprises and to the conditions that foster this growth.

The Entrepreneurship Indicators Programme (EIP), launched by OECD in September 2006, has as main goal to build indicators that measure the determinants, performance and impact of various facets of entrepreneurship, and that also are comparable among Countries.

This paper shows an empirical analysis to investigate on the definition of High Growth enterprises, described in the EUROSTAT-OECD Manual on Business Demography Statistics. In particular, various strategies for determining HG rates and their impacts on entrepreneurship are tested, especially with regards to wealth and employment creation contribution. For this purpose different sets of potential high-growth enterprises are compared in terms of employment and turnover.

Furthermore, a set of economic performance indicators from balance-sheet accounts are used as significant instruments to quantify the economic and financial performance of the HG enterprises.

Introduction

In recent years, the political and academic interest in entrepreneurship and its determinants is grown. Policy makers give more importance to the development of high growth enterprises and to the conditions that foster this growth.

The Entrepreneurship Indicators Programme (EIP), launched by OECD in September 2006, has as main goal to build indicators that capture various aspects of the entrepreneurship process and that are internationally comparable. These indicators are grouped together into three themes: *Determinant* (factors that impede or motivate entrepreneurship); *Entrepreneurial performance* (measures that provide information of the state of entrepreneurship); and, *Impacts* (outcomes of that performance on the economy as a whole).

One of the objectives closely related to entrepreneurship is identified as growth potential of enterprises. There are two important indicators in the EIP framework that belong to performance group: rates of high-growth firms based on employment growth and rates of high-growth firms based on turnover growth.

A variety of studies have been attempted to measure the high-growth enterprises. The definition recommended in Eurostat-OECD Manual on Business Demography Statistics is as follows: *All enterprises with average annualised growth in employees (or turnover) greater than 20% per annum, over a three year period, and with more than 10 employees in the beginning of the observation period, should be considered as high-growth enterprises.*

This paper shows an empirical analysis to investigate on this definition of high-growth enterprises. In the first paragraph the potential high-growth enterprises are analyzed by economic sector and employment size class and the reference population of high growth is then identified. After an overview of the high-growth definition, in the second paragraph we analyse the contribution of high growth enterprises in terms of employment and turnover, underlining the differences among sectors of economic activity.

A shift-share analysis is applied to account for the competitiveness of high-growth enterprises, compared to other sub-sets of enterprises. Finally, in the last paragraph, a set of economic performance indicators calculated from the balance-sheet accounts are used as significant instrument to quantify the economic and financial performance of the high-growth enterprises.

1. The potential HG and HG threshold

We define a potential population for the identification of HG as follows:

All enterprises that are active in three consecutive years, excluding the enterprises born in the beginning of the observation period. The potential population for the HG in the year 2005 is:

$$AA = N_{2002} \cap N_{2003} \cap N_{2004} \cap N_{2005}$$

Table 1 – Potential Population for High Growth

NACE	Size class of employees (year 2002)							Total
	0	1	2-4	5-9	10-14	15-19	20+	
C	716	292	621	599	340	148	299	3,015
D	176,413	47,051	71,460	49,190	25,256	12,562	31,143	413,075
E	807	113	173	137	97	35	295	1,657
F	226,429	49,649	56,870	25,730	8,547	3,240	5,021	375,486
G	709,497	96,445	89,829	33,340	10,791	4,201	8,086	952,189
H	96,378	30,515	33,543	12,949	3,568	1,439	2,423	180,815
I	77,511	10,245	13,183	7,283	2,848	1,310	3,804	116,184
J	31,204	5,549	6,915	1,645	406	191	1,026	46,936
K70.71.73	113,743	8,308	4,534	1,091	326	135	305	128,442
K72	33,920	6,069	8,966	4,025	1,407	583	1,498	56,468
K74	370,322	40,698	33,797	10,853	3,406	1,346	4,319	464,741
Totale	1,836,940	294,934	319,891	146,842	56,992	25,190	58,219	2,739,008

To identify the high-growth enterprises only the enterprises with 10 or more employees are taken into account (Table 1). This threshold of ten employees is a convention and it is applied to avoid the introduction of biases that overstress the importance of small enterprises. But there is the hazard to exclude too many enterprises. In a economy such as the Italian one, characterized by small enterprises, the reference population of high-growth with ten or more employees represents only the 5.1% of all enterprises¹.

Furthermore this percentage changes depending on the economic activity. The more significant differences are for “Mining and Quarrying” sector with 26.1 %, “Manufacturing” sector with 16.7 %, and “Electricity, Gas and Water Supply” sector with 25.8 %. On the other hand, in the “Real Estate Activities”, “Renting of machinery and equipment without operator and of personal and household goods”, and “Research and Development” activities, the percentage of reference population of HG is 0.6 %.

The threshold (employees \geq 10) gives some economic sectors an advantage over others. An equal number of employees (ex. 10 employees) assumes different economic significance for different sectors of economic activities.

An enterprise could be an high-growth enterprise if compared to the enterprises that belong to the same economic activity sector. Indeed the employment average is more variable from sector to sector and it is below the threshold of 10 employees almost for all economic activities. It is also true that the arithmetic average is affected by the amount of smaller enterprises. For this reason the characteristic dimension (entropy average) can be calculate. The entropy average assigns to larger size units a weight more proportional than others. Formally:

$$MH = \exp \left[\frac{1}{A} \sum_i A_i \log \frac{A_i}{N_i} \right]$$

where:

A= overall amount of employment;

A_i=amount of employment of size class *i*;

N_i=number of units of size class *i*.

¹ The potential population of high-growth described in table 1 is representative of the structure of whole Italian economy.

Table 2 – Arithmetic and entropy average of Potential Population for High Growth

NACE	arithmetic average	entropy average
C	12.03	26.83
D	8.58	29.37
E	63.46	229.02
F	2.04	9.09
G	1.43	12.89
H	2.61	12.52
I	7.00	62.30
J	8.69	159.02
K70.71.73	0.43	9.67
K72	3.80	23.04
K74	1.73	30.18
Total	3.13	24.02

Although the entropy average takes account of the larger enterprises, some economic activities as F and K70.71.73 have a lower value than 10 employees (Table 2). Therefore, if it is important to put the threshold of 10 employees to avoid the small enterprise growth bias, on the other hand, this threshold doesn't capture the growth of the enterprises that belong to economic activities characterized by small size firms.

Furthermore, there are some enterprises that belong to the set of reference population of HG and that act in particular economic activities in oligopoly positions (for example the enterprises that belong to the sector E represent only the 0.1% of the Italian economy.) In these cases the growth doesn't reflect entrepreneurship. The enterprises in oligopoly positions can experience rapid growth that is unrelated to entrepreneurship. They are not entrepreneurial, because they don't create value through the identification and exploitation of new products, processes or markets, according to the definition of Entrepreneurial activity.

Therefore it is important that these differences among economic activities are taken into account in measuring and analysing the performance of high growth enterprises.

The threshold of 10 employees and the high variability among economic activities affects the high-growth enterprises and their contribution in terms of wealth and job creation.

2. The HG definition and the growth rate

With regards to the growth rate, the definition of high-growth enterprises recommended by the EUROSTAT-OECD Manual on Business Demography Statistics is as follows:

All enterprises with average annualised growth greater than 20% per annum, over three year period should be considered as high-growth enterprises. Growth can be measured by the number of employees or by turnover.

The high-growth enterprises are obtained applying to the reference population (enterprises with 10 or more employees) the following formula to employees and to turnover:

$$HG_empl = empl(xx)/empl(xx - 3) \geq 1.728$$

$$HG_turn = turn(xx)/turn(xx - 3) \geq 1.728$$

Excluding the enterprises whose growth was due to demographic events such as mergers, take-overs and break-ups, for the year 2005 the high-growth are: 12.788 equal to 9.1% of the reference population².

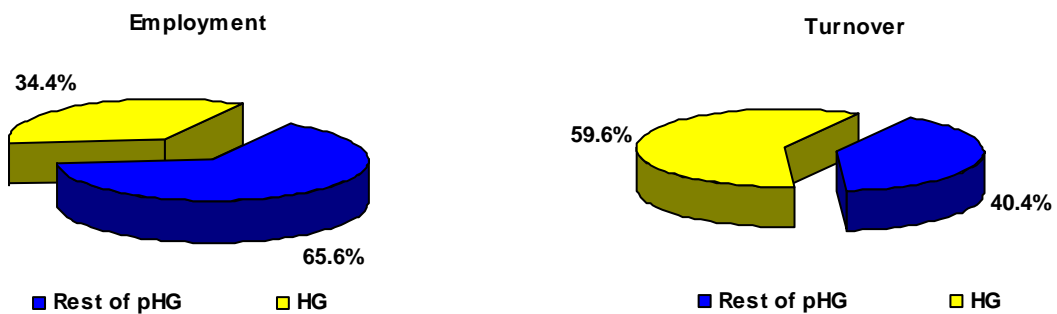
What is the meaning of this high-growth rate? What is the impact that these high-growth enterprises have on the economy?

Although the HG rate is 9.1% of a reference population that represents only the 5.1% of the whole potential HG population, it is interesting to note that the high-growth enterprises capture the 34,4% of the all job created from 2002 to 2005 and make a 59.6% contribution to the increase of turnover amount (Figure 1).

² In the EIP manual the reference population is close to the population of active enterprises in the year (xx-3) with 10 and more employees minus the real births in the same year with 10 and more employees.

This means that the high-growth definition according to EUROSTAT-OECD identifies the enterprises with better performance in terms of turnover, less in terms of employment.

Figure 1 – Percentage of employment and turnover of HG

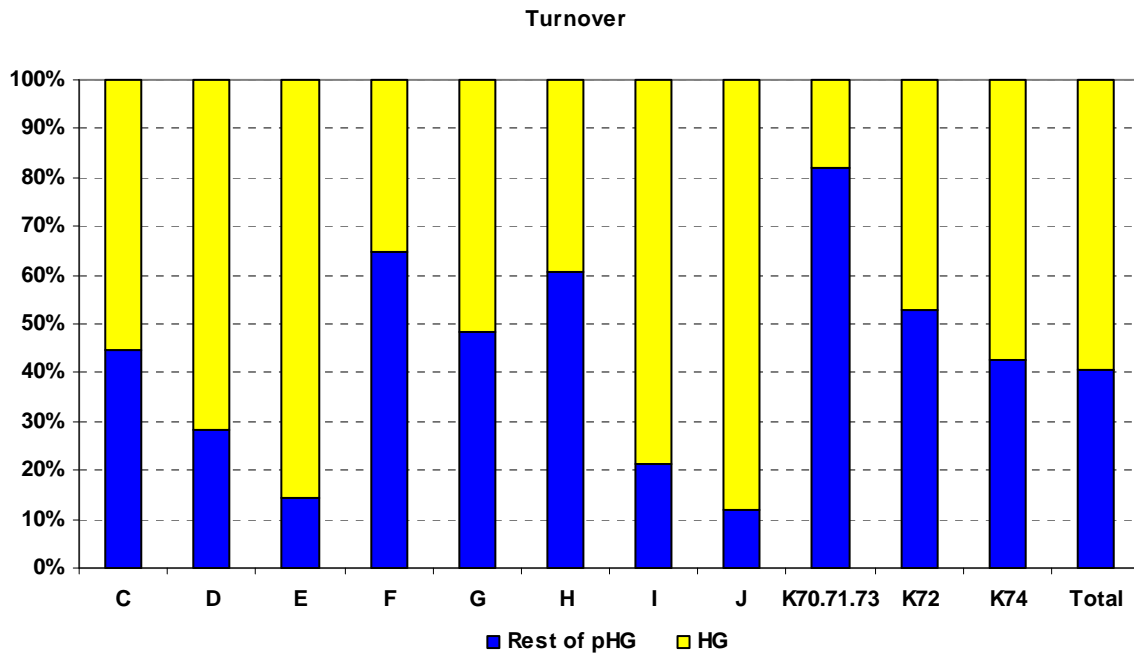


Looking at the contribution of these high-growth enterprises by sectors of economic activity, the distribution has a high variability (Figure 2). Only in the sectors as E, J and K74 the HG' s contribute to the job creation for more than 50%, while in the other sectors their impact has a lower influence. Most contribution to the job creation is due to small enterprises (65.6%) that represent the 95% of whole economy.

For the turnover the situation is a little different. The contribution of HG to the increase of turnover from 2002 to 2005 is more significant for all the economic sectors. The sectors F, K70.71.73 the contribution of high growth is lower, because they are affected of the economic composition of the reference population from which high-growth are identified.

Figure 2 – Percentage of employment and turnover of HG by sectors of economic activity





These results highlight that a positive correlation exists between employment and turnover, according to it the small enterprises have an amount of turnover lower than the bigger enterprises. Therefore the threshold of 10 employees is a average correct threshold also for the identification of high-growth enterprises in terms of turnover, but some economic activities are not significantly represented.

3. Shift-share analysis

The analysis of the growth in terms of employment and turnover of high growth enterprises described in previous paragraph stressed the influence of structural composition of the reference population from which the high-growth are identified. It is possible to obtain the same result from the shift-share analysis on the growth of employment and turnover.

Shift-share analysis permits to decompose employment or turnover growth into three components: (1) a global growth effect (trend component), which is that part of the change in total employment (or turnover) of a sub-population ascribed to the global rate of growth, (2) an industry mix effect, which is the amount of change the sub-population would have experienced had each of its industries grown at their global rates, less the global growth effect, and (3) a competitive effect, which is the difference between the actual change in employment (or turnover) and the employment (or turnover) change to be expected if each industrial sector grew at the global rate. The sum of these three effects equals the actual change in total employment (or turnover) of the sub-population that we want to analyse.

Growth of sub-population = **Trend Component (TC)** + **Industry Mix effect (IM)** + **Competitive Effect (CE)**.

Formally:

$$\frac{\Delta E_{i0}}{E_{i0}} = r_{oo} + \sum_h (r_{oh} - r_{oo})(E_{ih}/E_{i0}) + \sum_h (r_{ih} - r_{oh})(E_{ih}/E_{i0})$$

where:

E_{i0} = number of employees (or amount of turnover) of the sub-population i ;

E_{ih} = number of employees (or amount of turnover) of the sector h of the sub-population i ;

ΔE_{i0} = absolute variation of employment (or turnover) of the sub-population i ;

r_{00} = growth rate of employment (or turnover) of the all population;

r_{0h} = growth rate of employment (or turnover) of the sector h ;

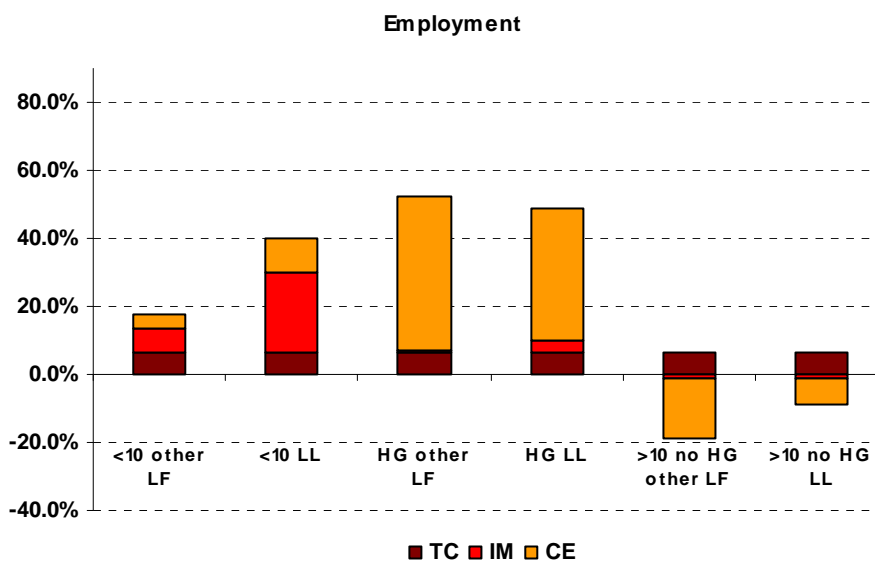
r_{ih} = growth rate of employment (or turnover) of the sector h of the sub-population i .

To value the effect of structural composition and the competitive effect, the high-growth enterprises are compared with other sub-populations. In detail it is possible to identify two sub-population from the whole potential population: the first set is made up by the enterprises with less than 10 employees; the second one is the complementary part of the high-growth, that is the enterprises with 10 or more employees that have not a growth in terms of employment or turnover at least of 20 percent. The shift-share analysis was applied dividing each of these sub-populations in other two sub-sets according to the legal form: the limited liability company and other legal forms. So in all 6 sub-sets are identified:

- 1) Other legal forms of enterprises with less than 10 employees;
- 2) Limited liability company with less than 10 employees;
- 3) Other legal forms of HG enterprises;
- 4) Limited liability of HG enterprises;
- 5) Other legal forms of enterprises with 10 or more employees that are not high growth;
- 6) Limited liability company with 10 or more employees that are not high growth.

The shift-share analysis is applied both employment and turnover growth.

Figure 3 – Components of employment growth, identified by shift-share analysis of 6 sub-populations



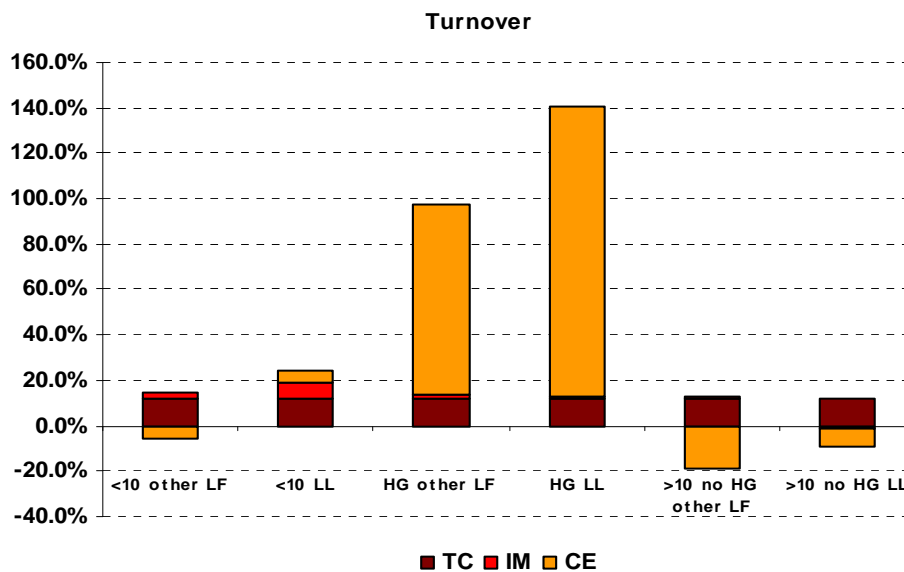
In the period 2002-2005, the employment is grown 6.5% (TC) (Figure 3). The analysis of competitive effect (CE) is not significant, because the population of high-growth, both limited liability company and the other legal forms, is made up of the enterprises with a higher growth ($\geq 20\%$) and so they are more competitive than all the other enterprises.

What is important to highlight is the weight of the mix industry effect (IM). For the enterprises with less than 10 employees this component represents almost the 7% (on a overall growth of 17%) for the other legal forms and the 23% (on a overall growth of 40%) for the limited liability company with less 10 employees. On the other hand, for high-growth enterprises the mix industry effect is only of 0.7% for the other legal forms and 3.6% of the limited liability company. The other two sub-sets have not a growth in the period 2002-2005. This means that the sectors of economic activity with faster growth are more present in population characterized by small enterprises. In the high growth populations sectors as G and K represent a smaller percentage.

Same results are obtained by shift-share analysis on the growth of turnover (Figure 4). But in comparison to the employment, the structural component is not significant neither in the high growth sub-populations or in the sub-populations with less than 10 employees. The competitive effect, due to the populations'

characteristics, seems to be the only component that gives a significant contribution to the turnover growth of high growth enterprises.

Figure 4 – Components of turnover growth, identified by shift-share analysis of 6 sub-populations



4. Analysing a Firm's Financial Performance

To value the characteristics of HG enterprises with regards to their financial performance, some indicators have been calculated for the limited liability companies, three of the sub-populations as described in §3. The performance analysis focuses only on *limited liability companies* because of the availability of micro data; in fact the time series of data is taken from Balance Sheets that cover, by definition, only the whole of *limited*. In particular we have considered:

- 1) Limited liability company with less 10 employees;
- 2) Limited liability of HG enterprises;
- 3) Limited liability company with 10 or more employees that haven't high growth.

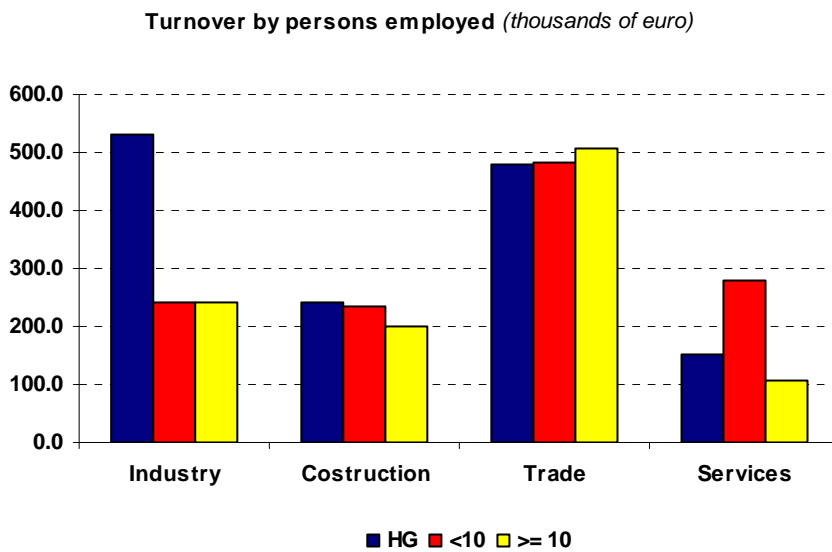
The indicators calculated using some accounts aggregates of Balance Sheets are a technique of control on the state of health of an enterprise and represent an essential tool to effect investigations of financial economic character.

The principals indicators that we have analyzed are:

The turnover by persons employed is a "raw" performance indicator; it represents the most immediate measure of business output. It is calculated as ratio among the revenues of the sales and the number of persons employed

As it doesn't take into consideration the incidence of the costs due to the characteristic management, it must jointly be analyzed with another indicator: the value added by persons employed.

Figure 5 - Turnover by persons employed of 3 sub-populations by sector of economic activity



Premised that in the period 2002-2005, the turnover by persons employed records the same levels for each subset and for each sector, we focalize the attention only on the year 2005.

The turnover by persons employed (Figure 5) results higher in the industry for the HG enterprises (around 530 thousand Euro by persons employed) and lower (around 100 thousand Euro by employed) for the sub population of enterprises with more 10 employees but not high growth. In the sector of services, enterprises with more than 10 employees produce 105 thousand Euro by persons employed, while enterprises with less than 10 employees records double values, reaching levels of 278 thousand Euro by persons employed, much more than the HG enterprises that produce 151 thousand Euro by persons employed.

In the sector of commerce HG enterprises records a turnover by persons employed smaller (around 479 thousand Euro) both in comparison with enterprises with less than 10 employees (484 thousand Euro) and enterprises with more than 10 employees (a little more than 506 thousand Euro by persons employed). The HG enterprises records best performance in the sector of constructions even if the distance with enterprises with more than 10 employees is more contained in comparison to the sector of industry.

Same results and considerations are obtained analyzing the **value added by persons employed** (Figure 6), which values are always lower than the ones of the turnover by persons employed, as costs of the characteristic management are here included.

This **value added by persons employed** indicator represents the “real” wealth created by the processes of production of goods and services that pay for all the production factors. It is calculated as ratio between the characteristic value added (the difference between the value of the production and the costs of subjects, services and enjoyment of goods) and the number of the persons employed.

Figure 6 – Value added by employed of 3 sub-populations by sector of economic activity



In 2005, the highest value is reached in the industry sector by HG enterprises (around 77 thousand Euro by employed) and the lowest (41 thousand Euro) is realized by enterprises with more than 10 employees belonging to the services sector. HG enterprises record the best performances also in the sector of constructions, while they do badly in the sectors of commerce and services. In these last two sectors those enterprises producing more wealth are respectively those with more than 10 employees and those enterprises with less than 10 employees.

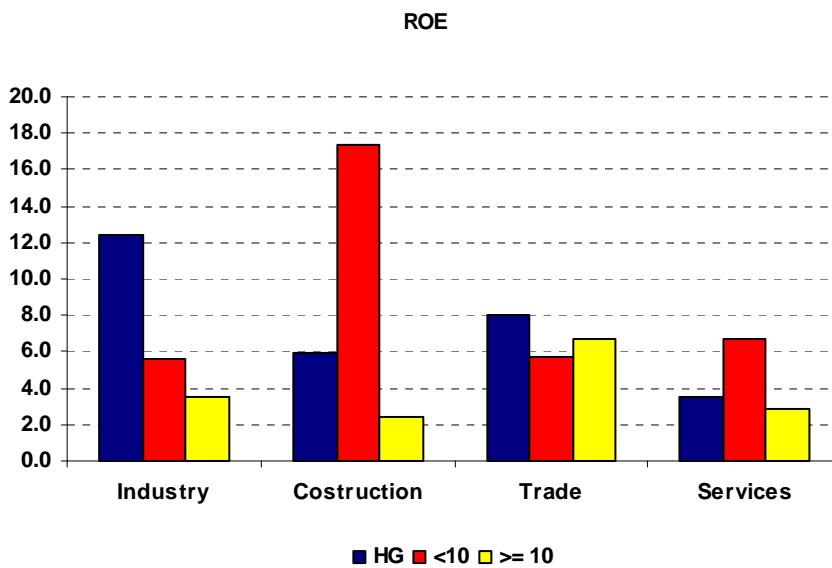
Other useful indicators to underline the capability of a firm in producing profit are the ROE e ROS measures.

The ROE (Return on Equity) represents the productivity obtained by the proper capital in terms of profit.

It expresses the return that a firm has had on the net property (that is the "inside" source of financing).

The stakeholders, in particular the shareholders, use this index to calculate in what measure investment is transformed in profit. It is calculated as ratio between the profits of exercise and the net property.

Figure 7 – Return on Equity by sector of economic activity

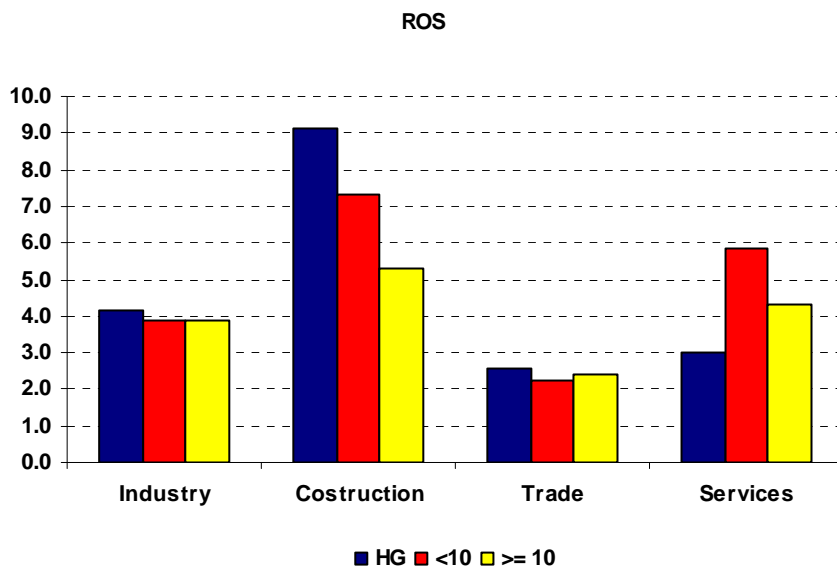


The profitability of the capital is big in the industry and commerce sectors for HG enterprises, while it is bad in constructions and services (Figure 7). In the last sectors, the analysis of the profitability shows that "*small it doesn't want to say inefficient*": enterprises with less than 10 employees are more competitive in comparison with HG enterprises. In constructions, the profitability of the capital of enterprises with less than 10 employees is 17.4% against the 6% of HG; in the sector of services, enterprises with less than 10 employees records a profitability of around 7% against the 3.5% of HG enterprises.

Finally, the **ROS (Return on Sales)** indicator measures the profitability of the sales in terms of characteristic management. Is an indicator influenced by the sector in which the firm operates. It serves for measuring the return of the sales on the profits.

In poor words it helps to understand how much profit margin a firm produces, in percentage, of turnover or revenues. HGs shows the best performances in terms of profitability in all sectors apart services (Figure 8); This fact is substantially founded for the all indicators; probably it reflect the typical structure of the services sector where the impact of the labour cost affects negatively the performance of the HG.

Figure 8 – Return on Sales by sector of economic activity



5. Conclusions

The analysis carried out in this work shows that the high growth are the enterprises with more performance than others, above all in terms of turnover.

The performance economic indicators show that the HG are the best in terms of profitability, especially in the sector of Industry less in the sector of services.

But the threshold of 10 employees according to which the high growth are identified, is perhaps too much restrictive for those sectors characterized by micro and small enterprises. The statistical analysis and techniques described in the previous paragraphs, have shown that high growth enterprises don't capture a significant part of the growth especially in the services sector.

The characteristic dimension could be used as threshold to calculate the high-growth enterprises. But also this measure would be too much restrictive.

To use a growth composite indicator (we are going to work on this issue) that take account of both the arithmetic average and the characteristic dimension of the economic activity sectors, would be desirable, especially in economies as the Italian one, characterized by small enterprises, even though a comparability among Countries would be more difficult.