

## STATISTICAL ANALYSIS OF THE COMPANIES MAIN CHARACTERISTICS FROM MANUFACTURING SECTOR AT LEVEL OF E.U.

Assoc.Prof.PhD Costel Ionaşcu Department of Analysis, Statistics  
and Mathematics, University of Craiova, E-Mail:  
icostelm@yahoo.com

Prof. PhD Carmen Radu Department of Analysis, Statistics and  
Mathematics, University of Craiova, E-Mail:  
carmenrozana@yahoo.com

**Abstract:** The companies from everywhere are fighting for survival in an economical framework that is changing all the time. This fact is obviously intens when this economical framework is enlarging and includes more countries with many companies and markets. In E.U., although exists the same rules for the economical framework the companies meet new challenges. This is visible especially in the case of the recent included countries. For survival their companies must present a series of characteristics and adaptations. The identification of these survival characteristics it is possible only by doing a retrospective analysis for a long period of time. This paper focuses on the main characteristics of the companies from manufacturing sector of E.U. along the 1995-2007 periods, trying to identify the main tendency and the particularities of the companies from every country.

**Keywords:** business statistics, sectorial analysis, competitiveness, companies, European Union.

### 1. INTRODUCTION

There is only one constant in the economical area and that is *everything is continuously changing*. Is the same principle that lies at the base of every process from nature. A few questions will be always raised:

*How can a company to survive in this kind of environment?*

The answer was first time found by nature. An organism must continuously adapt to survive. A company can use the same idea to survive in the economical battle.

*What is happened when a new field is discovered?*

Every living organism is trying to use the new opportunity to increase the chance of surviving. The same situation appears when a new economical field becomes available.

For example, if the world from this analogy is E.U., the organisms are the companies then the new fields are represented by the countries that want to integrate in the E.U... In this case what is happening when a new country is integrated in the E.U.? Using the same judging as above, the companies from E.U. will try to use the new opportunity before the companies from this new country succeed to adapt at this new situation. If the companies from the new country are not protected in any way by their state then will succeed to survive only those that already have the necessary characteristics to adapt very quickly at the new environment.

### 2. THE HYPOTHESES

This phenomenon occurs in E.U. many times until now. Right now there are 27 countries integrated in E.U. with different particularities with great influence on the characteristics of their

companies. The number of E.U. countries was increased until now and will increase in the future so new economical fields will become available for the companies.

Because this phenomenon occurs relatively often, the companies from E.U. countries are adapted to continuous change. The main characteristics of them are changing also in order to survive, but how.

### **3. THE DATA**

Using the data provided by EUROSTAT database for every integrated country, we can identify their main characteristics of the companies used to survive and develop. Because this kind of analyze is too wide we are narrow it by limiting at the level of manufacturing sector, section DA-DE from NACE 2. The same type of analyze can be made at the level of the other economical sectors. The EUROSTAT database limits our research at the available data: 1995-2007 periods. Because of this restriction we cannot determine, for every integrated country, the changes in company's populations and the changes at the level of company's characteristics. The available data will help to do that only for countries integrated in E.U. after 1995 year. Other limitations appear because of the unavailability of data for Malta and because for the last two integrated country Romania and Bulgaria the data does not cover the period after the integration but only the year of integration in E.U.

For this analyze we studied the population of companies by using available indicators like: number of companies, size of the companies, investments per employees, investments in equipment and machinery, the number of worked hour, R&D expenditure, R&D personnel, apparent productivity, personnel costs.

### **4. THE ANALYZE**

Analyzing the population of companies from E.U. and from every new integrated country, after the moment of integration we expect to see one of following possibilities:

- the number of companies from integrated country will decrease, because of the incapacity to survive in the new environment in the first years after the integration and because of the hard conditions for creating new companies
- the number of companies will maintain at the same level and the size of them will grow or will shrink, because of capacity to survive of the companies and because of the hard conditions for creating new companies
- the number of companies will increase because of success to survive in the new context and because of good conditions to create new companies.

This kind of analyze requires to know the nationality of companies and of their founders but this information is not available in the EUROSTAT database.

The success of adaptation at the new environment can be measured by using well known indicators like: production value, value added at factors cost, turnover.

By analyzing the changing of this indicator we can see the transformation of the companies from every sector determined by the new environment. For example, we can see if the companies will increase or decrease their size. Other aspects that we can see are referring at the way that the companies use their main resources like humane resources, capital, research capacity and so on.

All the indicators used in this analysis can be grouped in the following categories:

a) Inputs - Resources at company's disposal, for example: numbers of employees, number of worked hours, investments per employed person, investments in equipments and machinery, R&D expenditure, R&D personnel.

b) Outputs – Results obtained by companies, for example: production value, turnover, value added.

c) Companies performances, for example: apparent productivity, turnover per employed person, investments per employed person, proportion of personnel costs in production value or in value added, proportion of investments in value added, proportion of investments in equipments in machinery in total investments.

Analyzing the population of companies we observed that all countries are grouped in two categories:

-first category formed by the first seven countries (Italy, France, Spain, Germany, Poland, Czech Republic and UK) with a cumulative percent between 78 and 72 from the E.U. population of companies.

-second category formed by all remaining countries with a cumulative percent between 22 and 28% from the E.U. population of companies.

The hierarchy of the countries from this category based on the volume of company's population is described below:

1. Italy with a population of companies between 25-22% from E.U. population of companies along the 1995-2007 periods and a slow decreasing tendency;
2. France (12-11%) – slow decrease tendency
3. Germany (11-8,6%) - slow decrease tendency
4. Spain (6,8-9,3%) – slow increase tendency
5. Poland (9,6-8,5%) – slow decrease tendency
6. Czech Republic – slow increase tendency
7. United Kingdom – (7,8-6,4%) – slow decrease tendency

From the first category only two countries (Spain and Czech Republic) had a slowly increasing population of companies. All other countries from this category had a slowly decreasing population of companies. Taking into consideration for this category the moments of integration in E.U. only Czech Republic and Poland can be monitored. In the case of Czech Republic the changes in the company's population was -1% but in 2007 the negative effect was eliminated. Poland's population was affected more: -8% in 2004, the first year after the integration, -6% in 2005 and -4% in 2007.

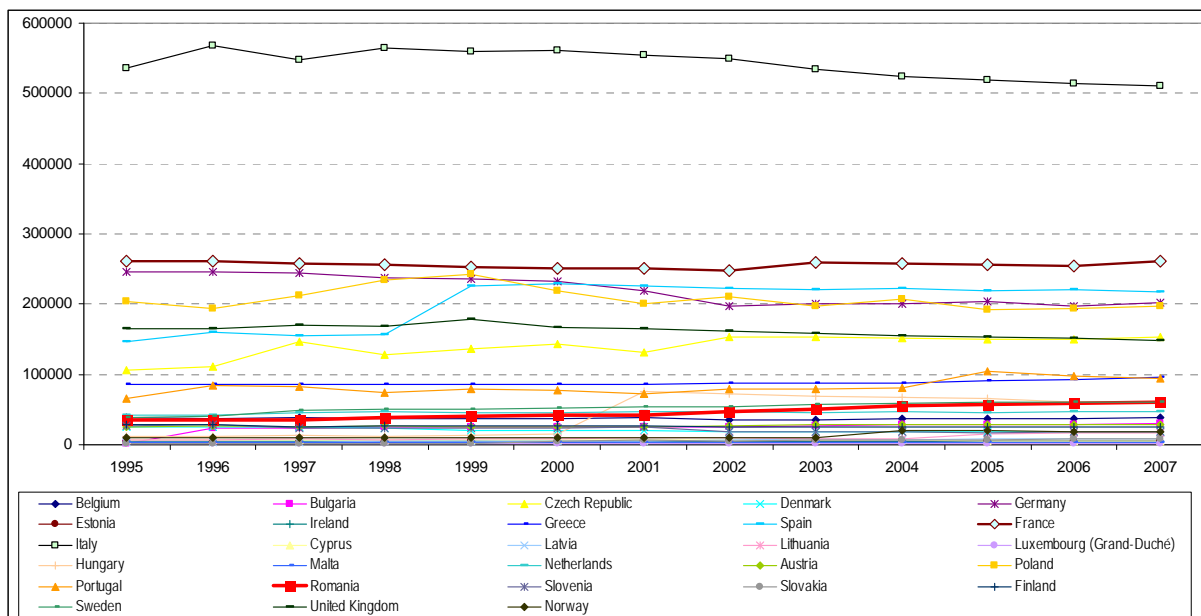


Fig. 1. The population of companies for E.U. countries, 1995-2007

Analyzing the countries from the second category we observe the following:

- for 6 countries from 10 integrated in 2004, the population of companies was slowly increased
- the most affected from all integrated countries are the remaining two: Hungary and Cyprus. In case of Cyprus the decrease tendency for company's population was maintained after the moment of integration: -12%. In the case of Hungary the population of companies followed a decreasing tendency starting with -5% in 2004 until -12% in 2007.
- In case of Romania and Bulgaria the same tendency was recorded before the moment of integration and after the first year of integration.

A smaller population of companies can mean sometimes larger companies or companies with better competitiveness. Beside of the effect of company's population volume we can measure what are the changes in the companies' profile.

The size of companies was decreased in this period at the level of every country, except Germany, Poland, Denmark and Cyprus. The companies from almost every country reduce their size to typical value around to 9-16 employees. There are some exceptions from this typical size like:

- Ireland where we find the biggest size of companies (at least three times bigger),
- Germany where the companies have double size comparative with typical size
- Greece with companies smaller the typical size with almost 50%

After the moment of integration the companies from Lithuania had changes their size with almost -50%, Slovakia between -6 and -22%, Estonia between -4 to -15%. Other countries like Czech Republic, Latvia, Slovenia maintained the size of their companies at same size. A few countries like Cyprus, Hungary and Poland increased the size of their companies. We can say that in the case of Poland and Hungary a decreasing population of companies has determined an increasing size of companies. A smaller size of a company has advantages like flexibility at the changing environment, a lower fiscal pressure.

Regarding the last two integrated countries - Romania and Bulgaria - we observed that for both countries the following:

- Romanian companies had to continuous decrease their size to about one half from original size;
- Bulgarian companies maintained their size with a variation within 10%

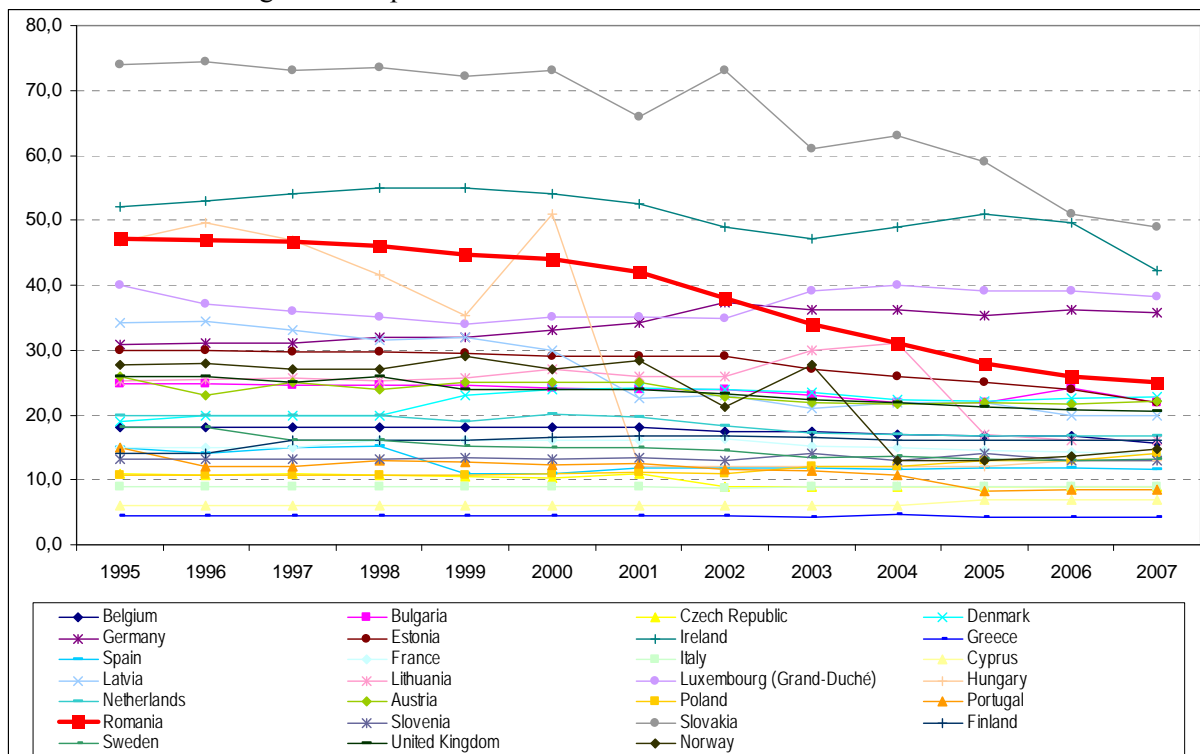


Fig. 2 The size of E.U. companies (the average number of employees), 1995-2007

Another adaptations of companies are visible if we analyze the way chosen by the companies for using their resources. We can extract the rules for using resources that conduct the companies in the battle for surviving. For that we are used the indicators that can measure how companies used the human resources, time resources, capital resources and research resources.

In order to study the use of human resources by the companies we analyzed the apparent labour productivity (fig. 3).

The first observation made was that the apparent labour productivity is increasing along the periods 1995-2007 at the level of every country without any exception. The increasing of the apparent labour productivity is more visible after the 2003 year. All countries had almost the same tendency except Ireland. The companies from that country are the biggest from E.U. and have a growing size tendency and a slowly growing population.

A typical three layer stratification can be identified:

- first layer formed only by Ireland with highest values for the apparent labour productivity (from 60 to 165 thousand euro) in all years between 1995-2007;
- the second layer - formed by countries with values for the apparent labour productivity between 30 and 60 thousand euro, like: Finland, Luxemburg, Germany, Norway, UK, Austria, France, Denmark, Italy, Greece, Spain, Czech Republic, Belgium, Netherland and Sweden.
- the third layer - formed by rest of the remaining countries.

All ten countries integrated in E.U. in 2004, recorded increasing levels of the apparent labour productivity after the year of integration. A conclusion must be drawn: *a stronger competition has determined the companies to improve the use of human resources in the same time with the decreasing of volume for human resources.*

Romania and Bulgaria follow the same trend like all countries from the third layer.

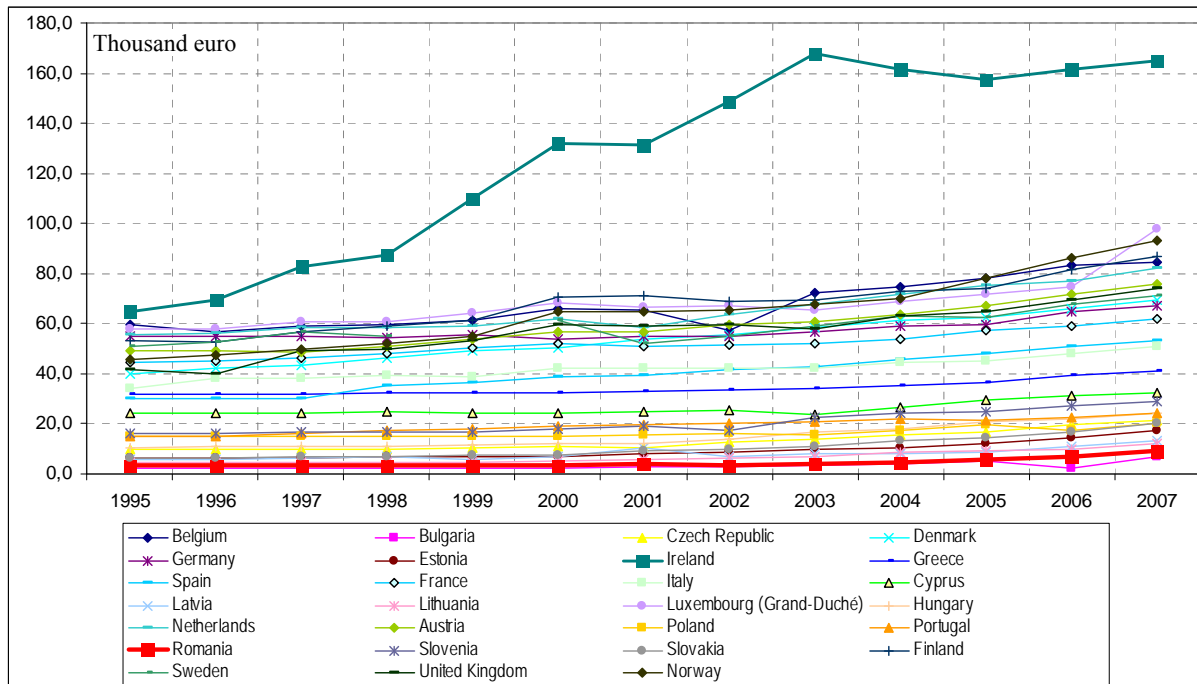


Fig. 3 The evolution of apparent labour productivity, 1995-2007

Another indicator used to measure the utilisation of human resources was the average number of worked hours per company (fig. 4).

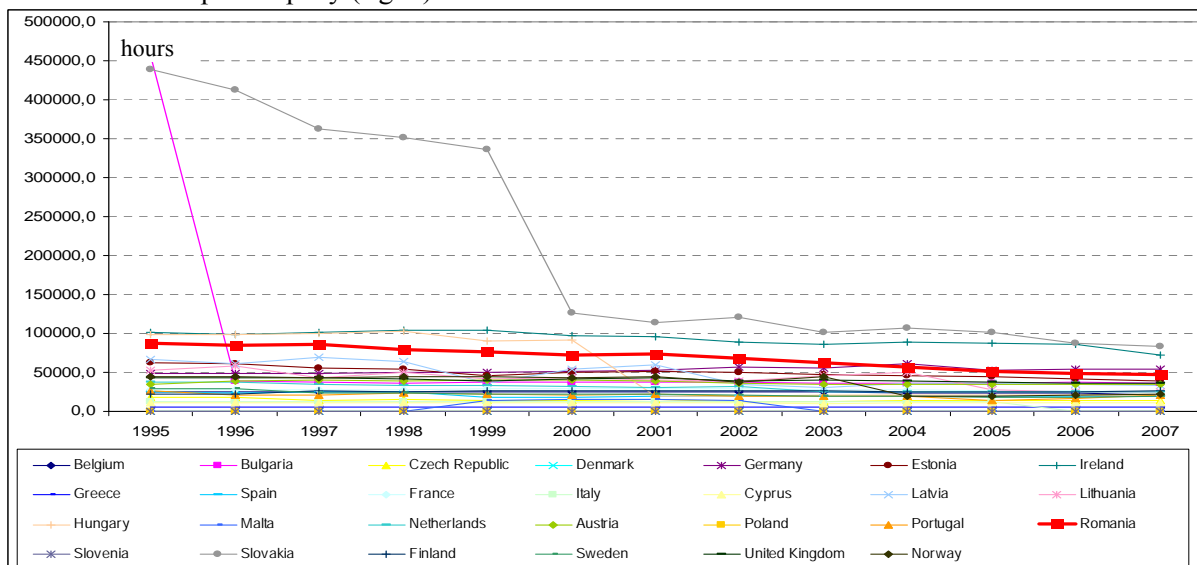


Fig. 4 The average number of worked hours per company, 1995-2007

Analyzing this indicator we observed a descending tendency. For the companies from almost every country this indicator has the same trend. A stronger decrease was identified at the level of Bulgarians and Slovakian companies until year 2000.

There is a maximum value of this indicator around 100000 average hours worked at the level of a company.

A lower number of employees can determine a lower number of hour worked. Taking into consideration the moment of integration for the last 12 countries, we determined that the values for this indicators was decreasing after the integration between -46% to -4% at the level of every countries but Cyprus and Czech Republic where was recorded increasing values between 1% to 7%.

For the last two integrated countries - Romania and Bulgaria – after the integration the tendency are different. Romania has the same decreasing trend (-9 to -17%) like all other countries but Bulgaria has an increasing trend (1% to 3%).

Other indicator was used to measure the way of utilisation for financial resources: the average volume of investments in equipments and machinery per company and the R&D expenditure. We expected to see through this indicator how the companies will modify their behaviour because of the changes in the economical environment.

The analyze of this indicator revealed that five from 27 countries had the biggest recorded values. All the remaining countries had values below 0,2 milions euro per company.

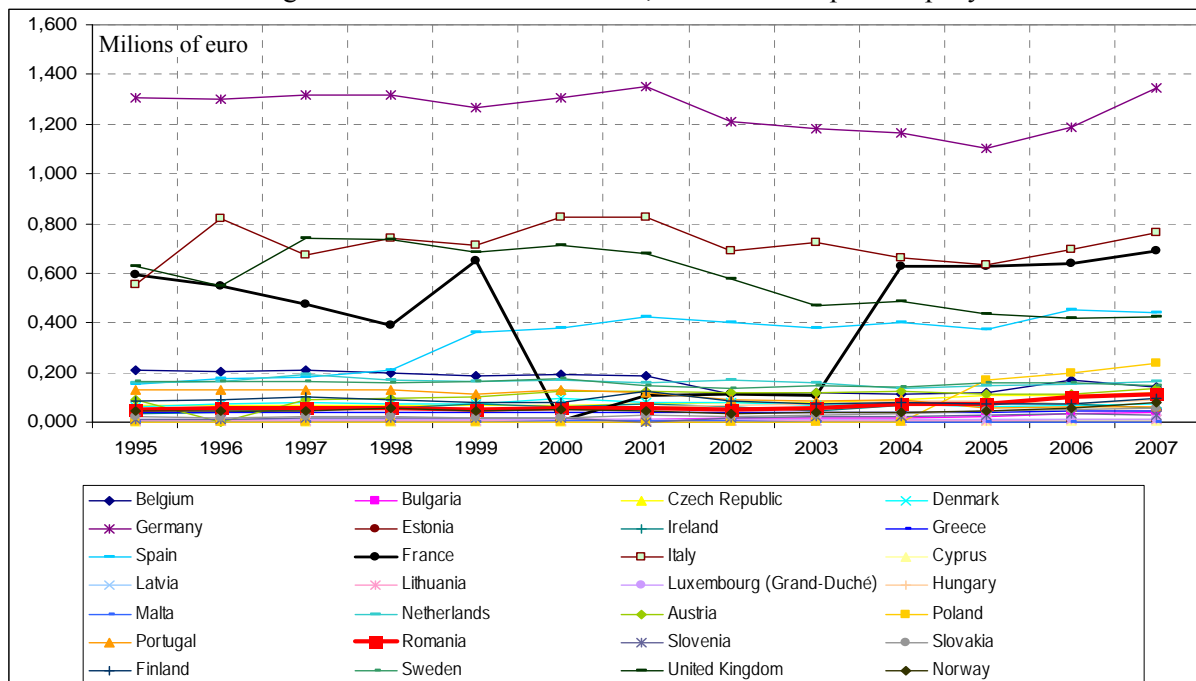


Fig. 5 Average volume of investments in equipments and machinery per company, 1995-2007

Two types of tendency was identified within a three layer stratification. From the highest to the lowest values of this indicator, the existing layer are:

- layer 1 - formed only by Germany with a slow decreasing values until 2005 and increasing values after this year. The recorded values for this country was up to six time more than the values recorded for countries from the third layer

- layer 2 - formed by four countries, in order: Italy, United Kingdom (with a slowly decreasing tendency), France (with strong descending trend until the year 2000 and a recovering trend after this year) and Spain the only country from this layer with an ascendent trend.

- layer 3 - formed by all remaining countries.

Analyzing the countries integrated in 2004 we observed that in the first year after the integration the values for this indicator for 3 countries (Cyprus, Hungary and Lithuania) was decreased with 3% and for the rest of the countries except Poland was increased with 13% to 44%. The EUROSTAT database does not have recorded data for Poland before 2004.

Regarding to Romania and Bulgaria we determined a similar increasing tendency.

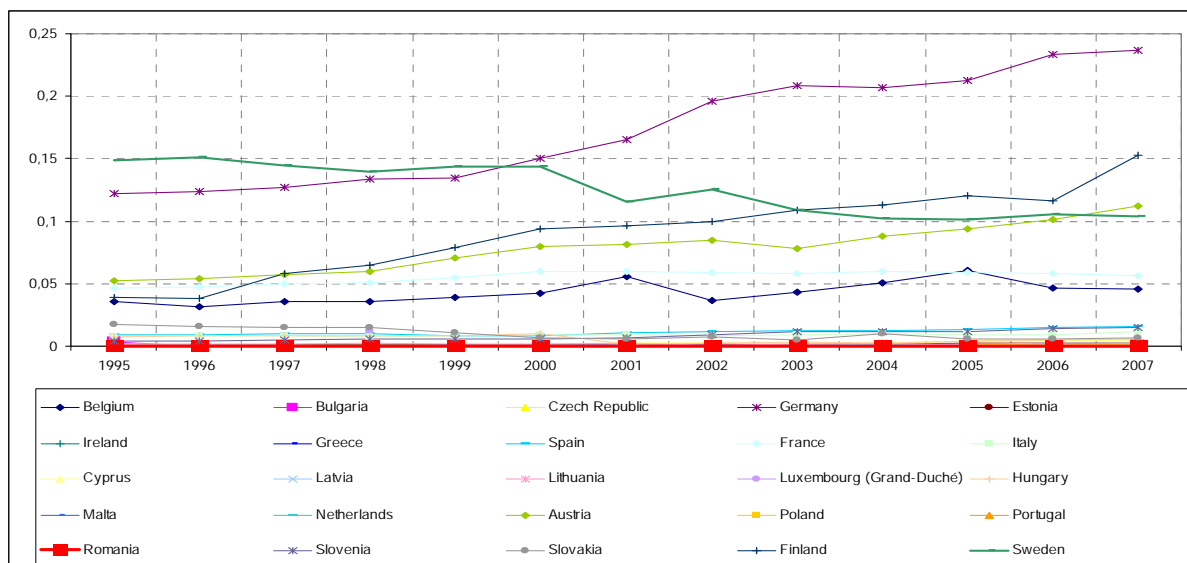


Fig. 6 R&D average expenditure per company, 1995-2007

The R&D average expenditure per company analyze revealed that all countries had values below 0,25 milions euro. From all 27 countries only 6 (in decreasing order: Germany, Sweden, Finland, Austria, France and Belgium) had values above 0,05 milions euro ant the rest of the countries had values below 0,015 milions euro. A detailed analyze of the 6 countries group hihhlight that all of them except Sweden had an ascending trend.

Another observation is that all of the 27 countries does not change the tendency for entire 1995-2007 periods. We cannot also discover any influences of the economical environment changes after the integration regarding to this indicator for all 12 countries integrated after 2004.

Extending the analyze by using other indicators like value added at factors cost per companies, the proportion of value added at factor costs in production value, the proportion of investments in value added at factors cost, we can underligne the following:

a) for value added at factors cost:

- the biggest companies had the biggest value added at the factors cost. From all 27 countries, the companies from Ireland had the increasing greatest values (at leas 3-4 times more than the companies from the rest of the countries).

- all other countries had a similar value for value added at factors cost

Because of the small number of companies Luxembourg is the next country judging by the values recorded value added at factors cost, followed by Germany and Norway.

- in the last two places we observed Romania and Bulgaria

- a great stability of tendency is revealed at the level of value added at factors cost. This highlight the that the changes generated by the integration very small influences for the las 12 integrated countries.

b) for the proportion of investments in value added at factors cost:

- the analyze of this indicator revealed that the last two integrated countries had the gratest value. This fact illustrate very good the ideaa that the new available fields are rapidly used by the most adapted. The most well placed companies from E.U. had turn their focus on newest integrated countries. A detailed analysis revealed that all last 12 integrated countries had passed through the same process.

c) for the proportion of value added at factor costs in production value:

- Studying the proportion of value added at factors cost in production value we can see that almost every countries have decreasing tendency except Hungary, Lithuania and Bulgaria. Typical values for this indicator, judging from the evolution on the entire period, are between 17% and 39%.

The biggest value are recorded by the companies from Austria and Ireland. Like other indicators case we observe no effect of the integration process on the companies behaviour.

## 5. THE CONCLUSIONS

Assembling together all the above aspects and other analyzed, we can show how the companies was transformed until 2007. The main ideas are:

- companies are decreasing their size (because smaller means more flexible, decreasing the costs, lower fiscal pressure) and try to obtain substantial economical results (meaning smaller but stronger). There are to few exception that try to illustrate the idea that the bigger means better.
- the number of employed personnel is decreasing but companies have compensated by the increasing investments in equipments and machinery
- companies use the remaining personnel highly efficient, limit its use below 100000 hours yearly and recompensing it with an increasing salary.
- companies make more investments and the main part of them is represented by the equipments and machinery because a good investment today can assure later a better chances to survive.
- the biggest investments are maded by the bigger companies from the biggest countries because they have access to more financial resources easy. This is one of a few aspects that is an advantages in favour of companies size.
- the companies from the newest integrated countries must be well prepared before the moment of integration otherwise will have problem with new environment
- there are a few aspects that are not affected by the changes generated of integration process.

A longer period of analyze can reveal other hided aspects that worth to take care of. The years after 2007 will show how the integration affected the companies from the last two integrated countries and starting with 2008 the effects of other kind of changes in the economical environment – the financial crisis.

## REFERENCES

- [1] C. Ionașcu, C. Radu, L. Dragomir, “Statistical analyze regarding the competitive potential of romanian enterprises, in the context of integration in European Union”, Volumul Simpozionului Științific Internațional de Statistică "Statistica în spațiul soluțiilor", Editura ASE, pp. 1-10, 2006.
- [2] C. Ionașcu, N. Marcu, M. Siminică „Statistical sector analysis of the competitiveness of firms from the European Union”, Metalurgica International, nr. 9, Special Issue, Editura Stiintifica FMR, București, pp. 5-11, 2009
- [3] C. Ionașcu, C. Radu, “Comparative analysis at the level of countries from European Union regarding the development potential of companies population”, Annals of University of Craiova- Economic Sciences Series, Volume 1, issue 36, Editura Universitaria, pp. 203-210, 2008
- [4] \*\*\* EUROSTAT database 1995-2007, available at the follwing address:  
[http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search\\_database](http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database)