

# EU Socioeconomic Indicators and Car Market

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**Abstract**—Since 2008 a new economic crisis is present in the entire planet. This crisis affects several domains of the economic but also of the social life. Consumption decreases due to the lack of necessary resources of households to increase their expenditures. The car manufacturing is one of the main industrial activities in European Union (EU) and the present crisis particularly affects it. The present study examines the correlations between several socio-economic indicators and car market in European Union. The target is to find out the impact of the present economic crisis on the car market in EU.

**Keywords**—European Union, Passenger cars, Social indicators, Correlations

## I. INTRODUCTION

THE continued slowdown in world economy and the gloomy forecasts for growth both in European and world economy in addition to the continuing decline of consumer confidence have begun to affect particularly negative European car manufacturers [1].

The lack of necessary capital hinders the ability of car manufacturers to finance their daily productive activities and at the same time the demand for new cars gradually weakens. Most of consumers are very hesitant to buy a new passenger car (PC). Another parameter is that it is more difficult to find the necessary financing from the banks to buy a new vehicle.

After an almost constant increase in total sales, the sales of new cars started to decrease last years, mainly as a result of increasing prices of fuel. After 2008 the decline of sales is deeper due to the impact of economic crisis. Several European countries that were traditional forces in the car manufacturing industry, such as Italy, Spain and Sweden are severely impacted from the global economic crisis [2]. The conditions in the car sector worsening even more from the decreased sales of the new passenger cars in the Eastern Europe markets, where in recent years, there was a continued increase in sales as a result of continuing economic development of these countries and the increase of new car owners [2].

According to financial analysts, the short-term forecast in the European car industry continue to be quite pessimistic without any significant signs of recovery due to the highly fluctuating conditions of the car market including competing pressures and unforeseen price of fuel and raw materials. The increased demand for new passenger cars in the countries under development could partially compensate the decrease of new car demand in Western Europe, Japan and North America. However, the economic growth of the countries under development is expected to decelerate in the future [3].

The European automotive sector is one of the main contributors of the economy of the European Union. Total income from the car manufacturing sector reaches 551 billion euros, corresponding to the 5% of GDP in the EU-27 [2]. This

implies a two-way relationship between the passenger cars market and several social and economic indicators. However, further investigation of the correlation between the above variables is necessary, to precisely quantify those correlations and identify any inferences. This work searches the correlations between several social and economic indicators and several indicators of the car market in European Union and the first work of a more general research between the socio-economic conditions and the performance and markets of several industrial sectors in EU.

## II. METHODOLOGY

The data used here are the data of the entire European Union of 15 countries (EU15) and of 10 individual countries (Austria, Belgium, Greece, Portugal, Sweden, Germany, France, Italy, Spain, United Kingdom). In particular, a selection was made from the huge quantity of available data. The data used are: the number of passenger cars (PCs) in use, new registrations of passenger cars, passenger cars per 1000 inhabitants, the forced absence of PCs, household expenses for travel. The social data used are: the gross domestic product (GDP), the GDP growth rate, per capita income and unemployment. The data come from several public sources, mainly Eurostat [4].

## III. RESULTS AND DISCUSSION

### A. Correlations with the Gross Domestic Product

Figure 1 shows the correlation between GDP and the number of PC in use for entire EU15 from 1995 to 2009. It is clear that the number of PC increases with GDP with a very good linear correlation ( $r^2=0.95$ ). This figure indicates that a regression in GDP will lead to a decrease of total PC in use. Figure 2 shows the same correlation, but for 10 individual countries of EU15, from 1990 to 2009. It is clear that a good correlation exists between those variables for the 10 countries of EU15. The best fit line of all points used here and the  $r^2$  are also shown in that figure. This figure also shows that all the countries have not the same slope, indicating that there is a particular trend inside each country and that trend needs further investigation.

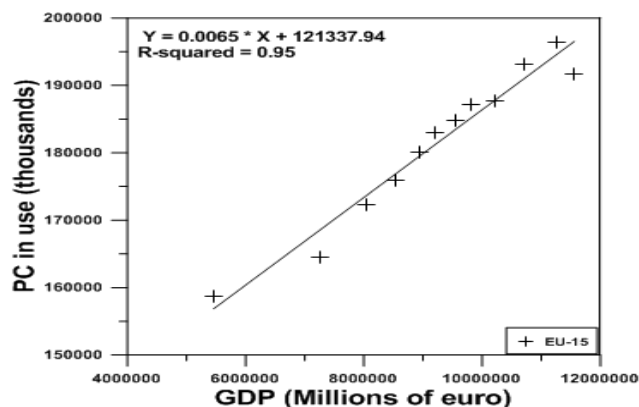


Fig. 1 correlation between gdp and number of pc in use in eu15 from 1995 to 2009

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Figure 3 shows the correlation of new PC registrations with GDP for the entire EU15 for the years 1995-2009. It is clear that this correlation is not good and cannot be used as a base for further analysis. Figure 4 shows the same correlation with figure 3 for the ten individual countries. Contrary to the results of figure 3, figure 4 shows that there is a quite good relationship in the case of several countries.

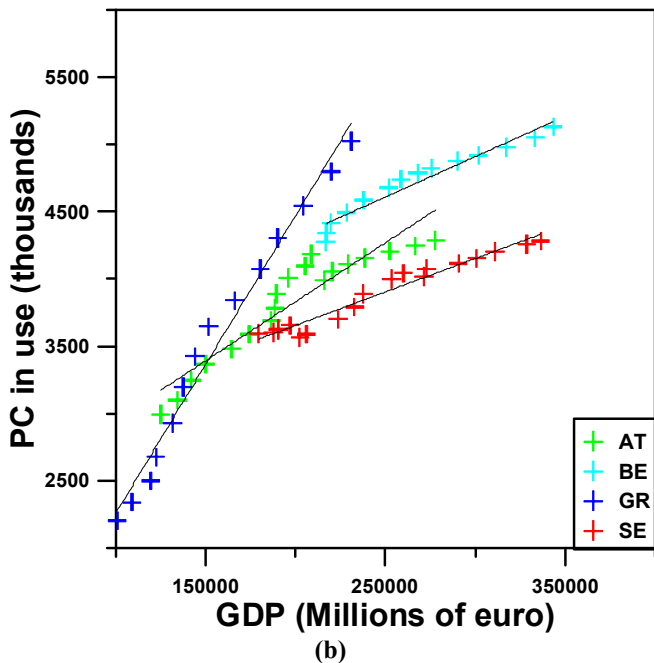
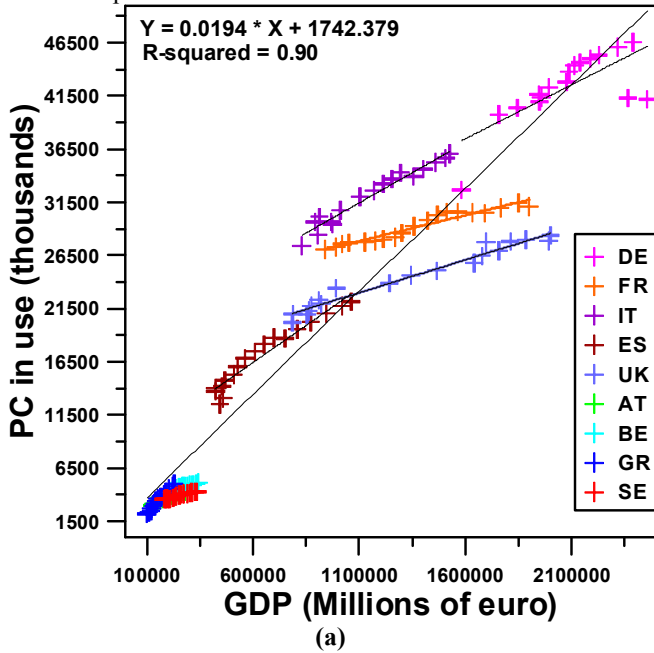


Fig. 2 Correlation between gdp (1990-2009) and number of pc in use in 10 countries of eu (at: austria, be: belgium, gr: greece, pt: portugal, se: sweden, de: germany, fr: france, it: italy, es: spain, uk: united kingdom). Upper figure: all countries, Lower figure, only the four countries of the down left part of upper figure

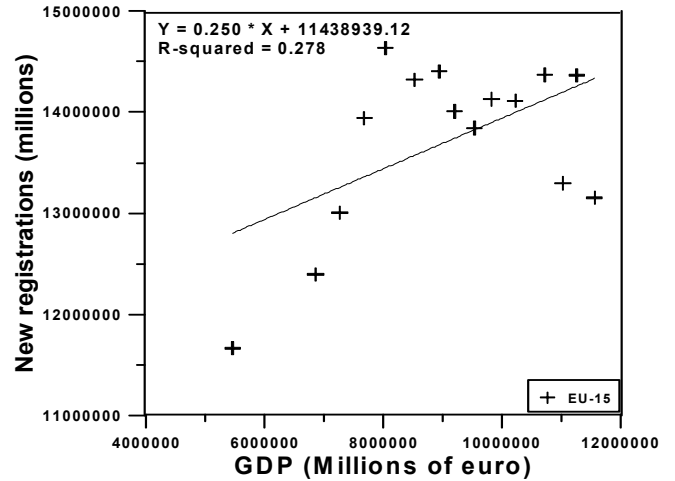


Fig. 3 Correlation between new pc registrations and gdp for eu15 (1995-2009)

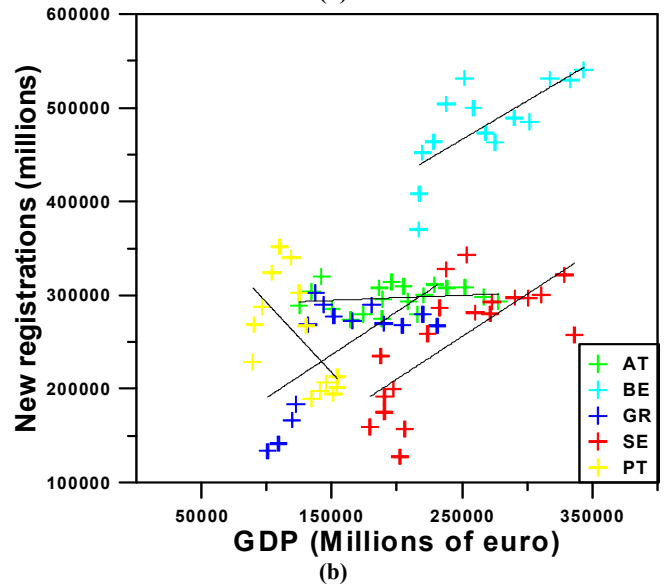
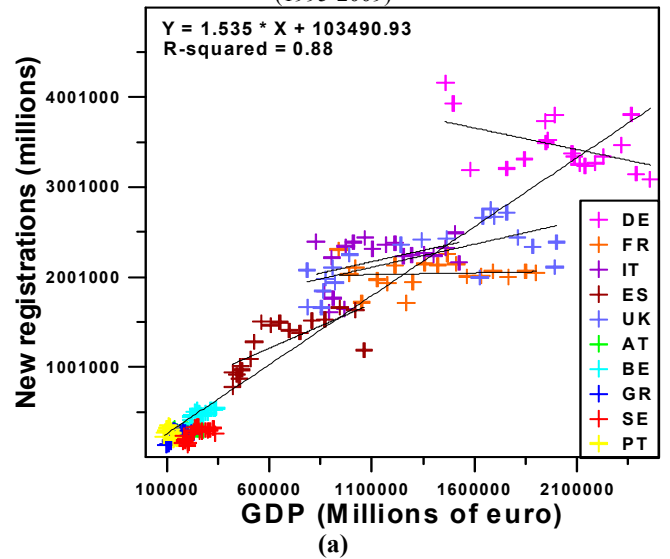


Fig. 4 Correlation between new pc registrations and gdp for 1990 to 2009 for the eu15 countries. the name of the countries are found in figure 2

Figure 5 shows the forced lack of car as a function of GDP for the entire EU15. The forced lack of car is defined as the lack of car due to low income (difficulty to buy, use and maintain a car). The percentage of enforce lack of car decreases linearly with GDP increase.

Figure 6 shows the same correlation as figure 5 for the 10 individual countries of EU. It is clear that the individual countries show the same general decrease of enforced lack of car due to GDP increase. As previously, each country has a particular trend which must be further investigated.

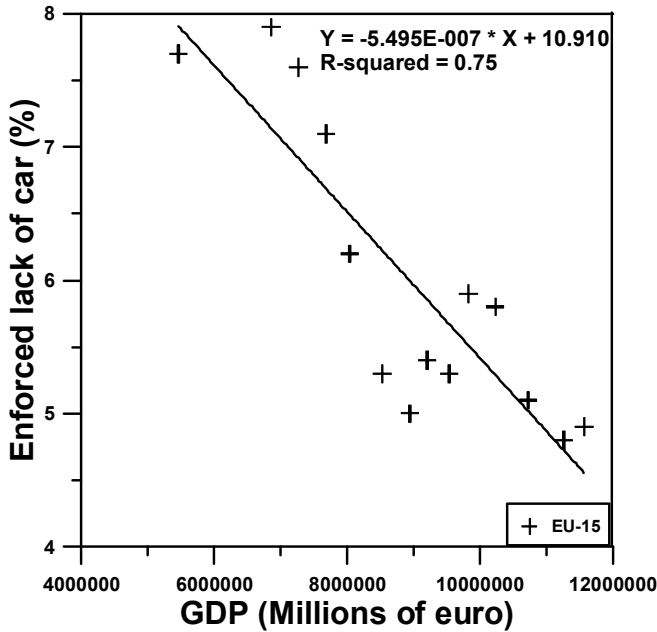


Fig. 5 Correlation between enforced lack of car and gdp for eu15 (1995-2009)

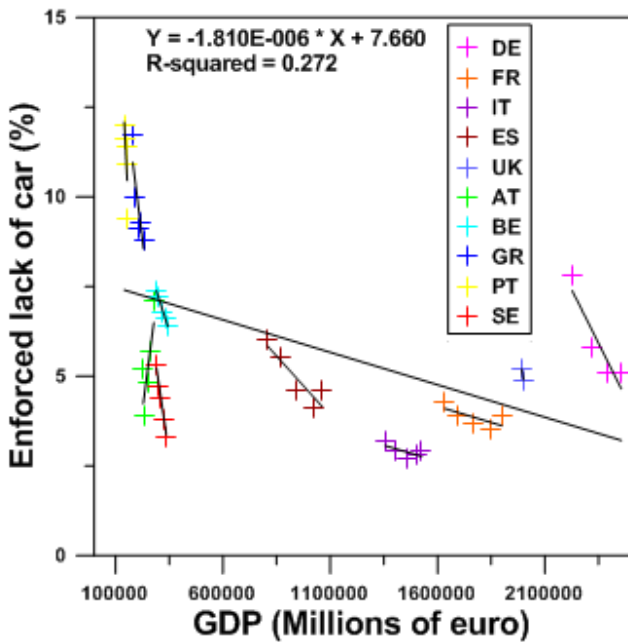


Fig. 6 Correlation between enforced lack of car and gdp for the 10 individual countries of eu15 (1990-2009). the name of the countries are found in figure 2

*B. Correlations with income per capita*

Figure 7 shows the correlations of PC/1000 inhabitants with the income per capita in EU15 for the years 1995-2009. This figure shows that the above correlation is very good with  $r^2=0.99$ , indicating that the new PCs registrations increases linearly with income. Figure 8 shows the same correlation for the 10 countries examined here, where is shown that several countries show a very good relationship. The relationship using all data is not very good, showing that each country has its own trend. That last conclusion is also verified from the different slope of the best fit line of each country.

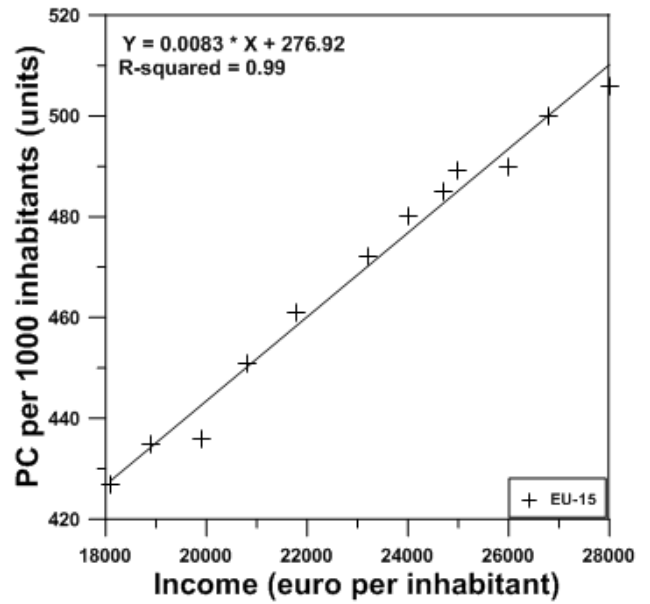


Fig. 7 Correlation between pc/100 inhabitants and income per capita for eu15 (1995-2006)

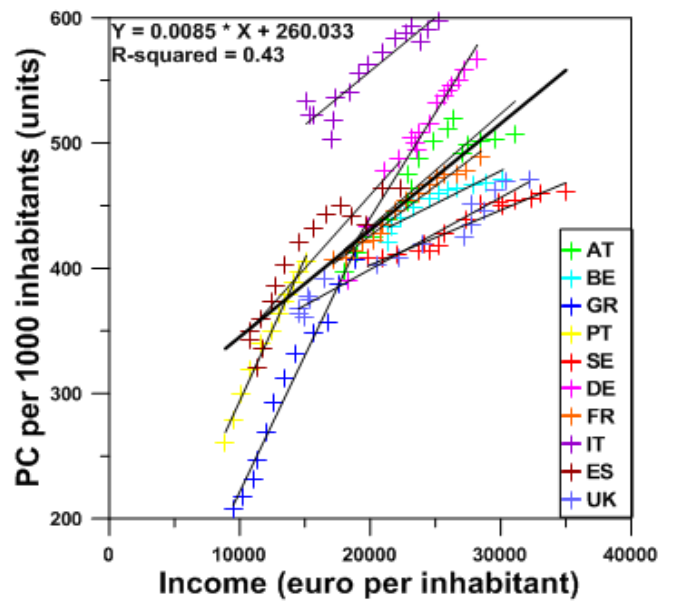


Fig. 8 Correlation between pc/100 inhabitants and income per capita for the 10 european countries (1991-2006). the name of the countries are found in figure 2

Figure 9 shows the relationship between new PC registrations and income per capita for the entire EU15 for the years 1995-2009. This figure shows that the linear correlation is not very good, and a correlation of a second order is better. Figure 10 shows the same correlation for the 10 countries examined here (1990-2009). The correlation is better for each country than the entire EU15; however, it is not very satisfactory once more. Another element is that the correlation of each country is very different from the correlation of the other ones.

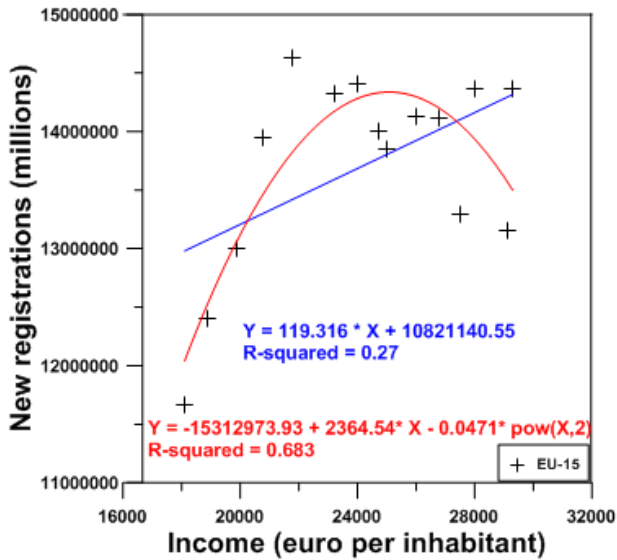


Fig. 9 Correlation between new pc registrations and income for the entire eu15 (1995-2009)

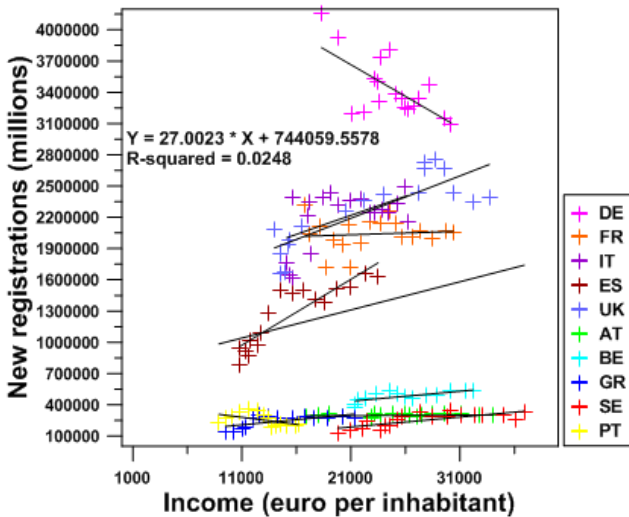


Fig. 10 Correlation between new pc registrations and income for the 10 countries of eu15 (1991-2009). the name of the countries are found in figure 2

Figure 11 shows the correlation between the household expenditure for transport and income per capita for the entire EU15 (1995-2009). That figure shows that there is a very good relationship between the two variables. Figure 12 shows the same relationship for each of 9 EU15 countries. Again, there

is a very good relationship between the above variables in the case of individual countries. This result indicates that a regression in economy will severe impact not only the market of passenger cars but the entire transport sector.

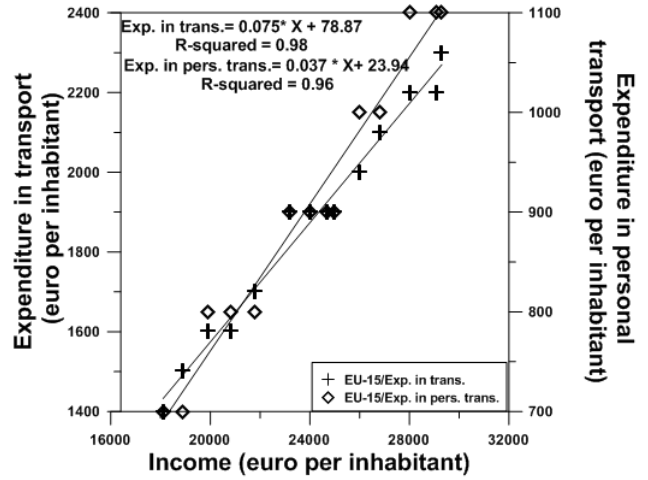


Fig. 11 Correlation between household expenditure and income per capita for the entire eu15 (1995-2008)

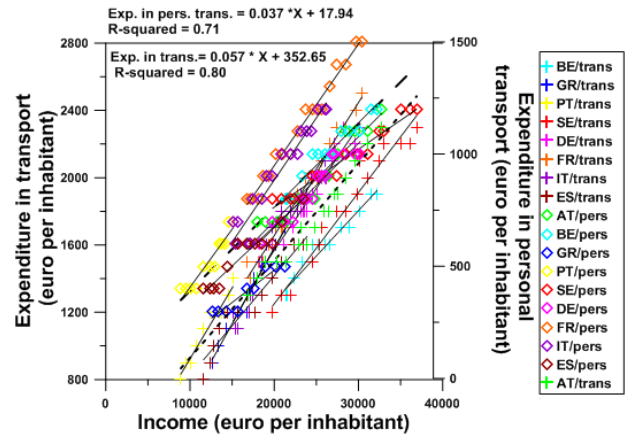


Fig 12 Correlation between household expenditure and income per capita for 9 countries of eu15 (1990-2008). the name of the countries are found in figure 2

C. Correlations with unemployment

Figure 13 shows the correlation between the number of PC/1000 inhabitants and unemployment of entire EU15 (1993-2006). That figure shows that there is a good linear decrease of the number of cars when unemployment increases. Figure 14 shows the same relationship for 10 EU15 countries (1993-2006). Generally, there is a decreased tendency; however, the relationship is not as good as in the case of entire EU15.

Figure 15 shows the new PC registrations as a function of unemployment for the entire EU15 (1993-2009). It is clear that there is a decrease trend of new PC registrations with an increase of unemployment. Figure 16 shows the same relationship in the case of 10 EU15 countries (1990-2009), where the same trend is observed. However, as in the case of the previous relationship, the trend in the individual countries is less good than in the case of entire EU15.

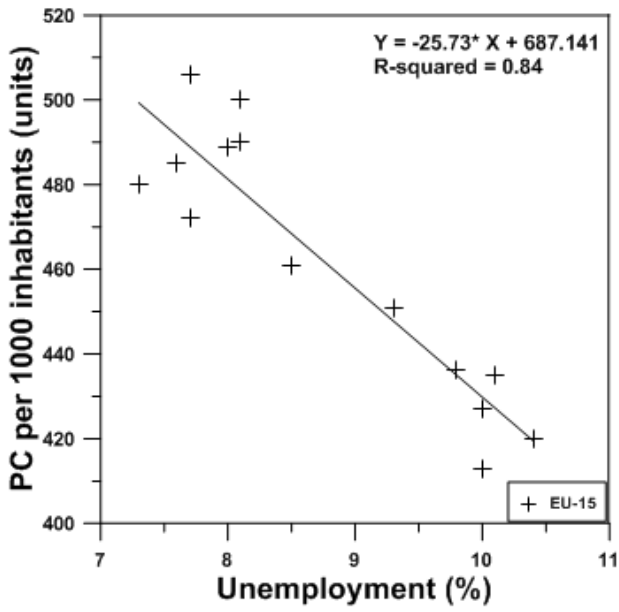


Fig. 13 correlation between the number of PCs/1000 inhabitants and unemployment in the entire EU15 (1993-2006)

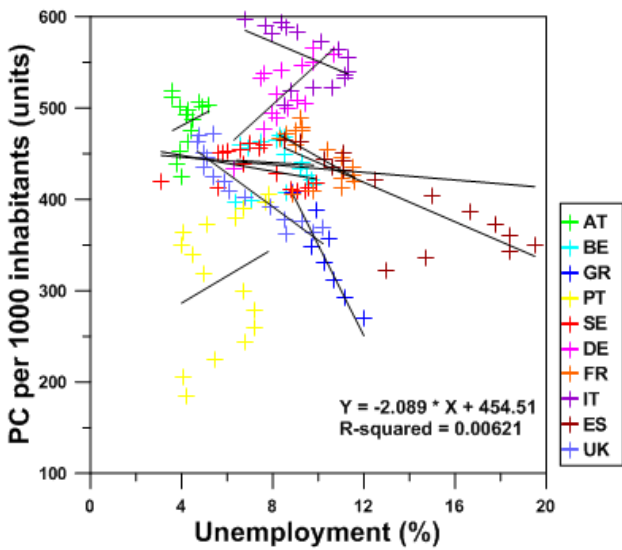


Fig. 14 correlation between the number of PCs/1000 inhabitants and unemployment in 10 EU15 countries (1993-2006). the name of the countries are found in figure 2

Figure 17 shows the relationship between enforced lack of car and unemployment for the entire EU15 (1993-2006). The correlation is very good, indicating that enforced lack of car increases with unemployment. Figure 18 shows the same relationship in the case of 10 individual countries. As there are not enough data in that last case, the conclusions must be very limited.

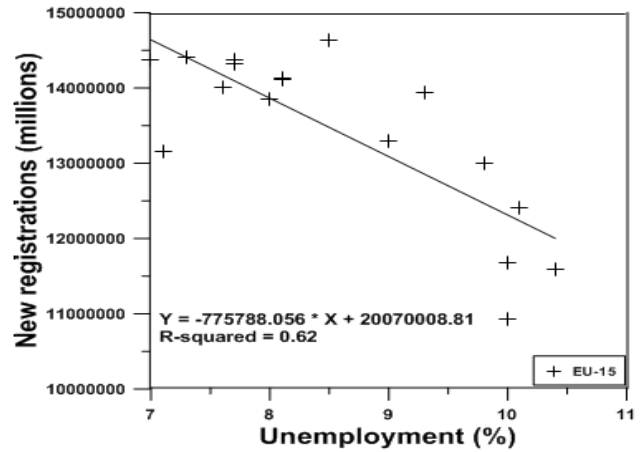


Fig. 15 Correlation between new pc registrations and unemployment in entire eu15 (1993-2009)

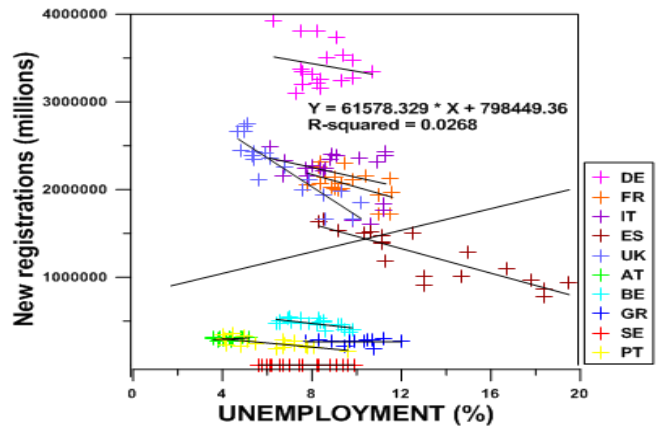


Fig. 16 Correlation between new pc registrations and unemployment in 10 countries of eu15 (1990-2009) the name of the countries are found in figure 2

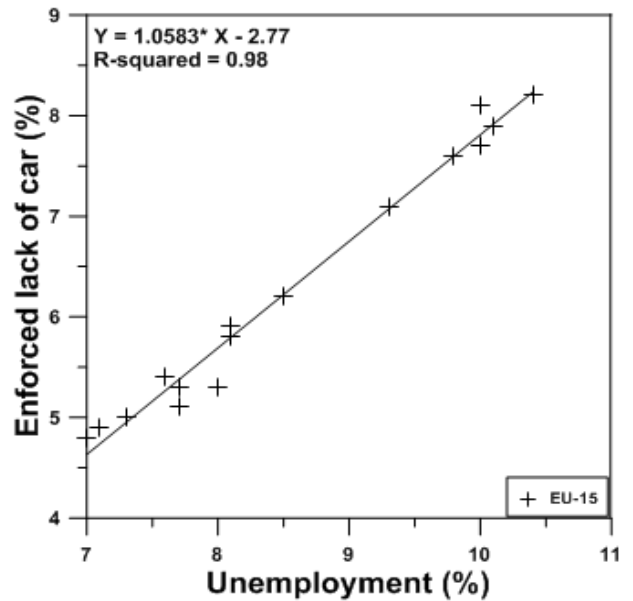


Fig. 17 Correlation between enforced lack of car and unemployment in entire eu15 (1993-2008)

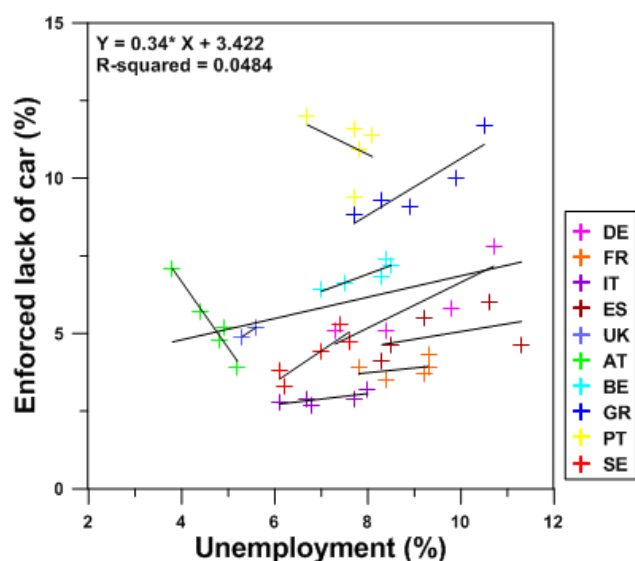


Fig. 18 Correlation between enforced lack of car and unemployment in 10 countries of eu15 (1993-2008 OR 2004-2008) the name of the countries are found in figure 2

#### IV. CONCLUSIONS

This work examines the correlations between several socio-economic indicators and car market indicators in EU15. The three socio-economic indicators used here are GDP, income per capita and unemployment. The car market indicators are: number of total PC in use, number of new PC registrations, number of passenger cars per 1000 inhabitants, household expenditure for transport and forced lack of car. The above parameters are examined in the case of entire EU15 or for 10 individual countries. This work shows that there are several very good correlations. In some cases there is the same trend between entire EU15 and the 10 individual countries, where in others there are different trends.

#### REFERENCES

- [1] Giuseppe Volpato, Francesco Zirpoli, (May 2010) The crisis and its implications for the automotive industry, MIP Politecnico di Milano, available at [http://www.francoangeli.it/riviste/riviste\\_allegati/poli/volpato\\_zirpoli.pdf](http://www.francoangeli.it/riviste/riviste_allegati/poli/volpato_zirpoli.pdf)
- [2] ACEA (European Automobile Manufacturers Association). Statistics on new car registrations in Europe 1990-2009. Economic report, (March 2009), [www.acea.be](http://www.acea.be)
- [3] Oica, Organisation Internationale des Constructeurs d'Automobiles Available in <http://oica.net/>
- [4] Eurostat, Available at <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>