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# **Public expenditure on education, education attainment and employment: a comparison among European countries**

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## **Abstract**

*It is widely acknowledged that education has been regarded as one of the leading factor of economic growth. In this study, we intend to go one step further and investigate causal relation between employment rates and public expenditure in education. Considering the 27 European Union countries, the model shows that – in countries where investments in education have been higher –in average of the last 10 years – also the employment rate has been higher.*

**Key words:** employment, public expenditure on education, university attainment, economic growth

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<sup>1</sup> Views expressed here are those of the authors and do not necessarily respect those of ISTAT.

The paper is the result of a joint research of the authors. As far it concerns this version of the work, Sects. 1, 4 and 6 should be attributed to R. Lima and Sects. 2, 3 and 5 to E. Grimaccia.

*"Considerate la vostra semenza:  
fatti non foste a viver come bruti,  
ma per seguir virtute e conoscenza."  
Dante Alighieri  
L'inferno, Canto XXVI*

## Introduction

The decline of employment is the worst effect of the recent economic crisis. People with lower education appear weaker in the Labour market, as OECD has very well shown (OECD 2013). At the same time job creation could be exploited if skills shortages were addressed (Schleicher 2006). However, as indicated by the European Commission in the "Annual Growth Survey for 2013," the investment in training and education is particularly relevant for the promotion of growth.

We believe that investing in education can support education attainment and improve the level of skills (Lima and Vassiliadis, 2006), reducing regional and social disparities (Lima, 2009), and ensuring more opportunities for young people (Lima, 2007). Knowledge and skills can increase employability of people, founding the basis of a fair economic growth.

Compared to other European countries, Italy has a low employment rate, together with low quote of people with Tertiary education attainment and low public expenditure on education.

In this study, we intend to investigate causal relation between the employment rate with public expenditure in education. In order to do this, we conduct an empirical analysis using a data set covering European Union countries for the period 2000-2011.

After a brief literature review, we present an overview of the general contest regarding public expenditure, education and employment in European countries. Then, a preliminary comparison of education expenditure, education attainment and employment in the European Union is shown. Afterwards, we present theoretical and mathematical formulations and outlines the applied work and results. The final section summarises and concludes.

## 1. Literature review

In human capital development, education is essential. Education is concerned with the improvement of "the whole person" including intellectual, character and psychomotor development. It is the human resources of any nation, rather than its physical capital and material resources, which ultimately determine the character and pace of its economic and social progress.

Thus, human resources: *"constitute the ultimate basis for the wealth of nations. Capital and natural resources are passive factors of production; human beings are the active agents who accumulate capital, exploit natural resources, build social, economic and political organization, and carry forward national development. Clearly, a country which is unable to develop the skills and knowledge of its people and utilize them effectively in the national economy will be unable to develop anything else"* (Harbison, 1973, p.3).

Education occupies an important place in most plans for economic and social development .

It is widely acknowledged that education has been regarded as one of the leading determinants of economic growth since the time of Adam Smith. Over time, many economic growth theories and models (such as Romer, 1990) have been developed relating education and economic growth. The belief, that education promotes growth has led governments of many developing countries to invest in the education sector.

Griffin and McKinley (1992) are of the opinion that human capital development strategy will require a change in the composition of government spending and that the percentage of the budget earmarked for activities, which do not contribute to development, should be reduced to a minimum. This includes spending on the military and internal security (which often have little to do with defending the state from external enemies), subsidies for some public enterprises (such as airlines, luxury hotels and breweries which cater primarily to upper income groups), excessively large bureaucracies in the public administration (which sometimes have been used to reduce unemployment among the urban educated youth) and external debt service.

The theoretical literature provides a backing for such a policy (Pissarides, 2000; Lima, 2009). However, quite a few empirical studies have tried to examine the relation between investment in human capital and economic growth and sometime they have failed to establish a robust relationship between education expenditures and growth.

In recognition of this relationship, developing nations have, in varying degrees, attempted to stimulate the accumulation of human capital through public education expenditure. The relationship has been tested for countries such as USA (Jorgenson and Fraumeni, 1992), Pakistan (Aziz, Khan and Aziz, 2008), Tanzania and Zambia (Jung and Thorbecke, 2001), Nigeria (Ogujiuba and Adeniyi, 2004) and India (Chandra, 2010). The results from the above mentioned papers indicate that education expenditures do affect growth positively. On the basis of micro data (individual-level data from household surveys), Boarini and Strauss (2007) estimates for several countries the employability premium from tertiary education (relative to upper secondary education) controlling for other individual characteristics, and find an average value of roughly two percentage points. Biagi and Lucifora (2008) studied the impact of education on unemployment using data from Labour Force Surveys for 10 European countries, and concluded that, controlling for a host of other factors (e.g., demographic variables or the business cycle), higher educational attainment (measured by the share of those with more than primary education) reduces unemployment rates, both for less educated and (especially) for more educated groups.

Furthermore, according to Blondal et al.(2002), in most countries, years of schooling minimizes the risk of unemployment, and hence the employment rate among those with tertiary education attainment is higher than among groups with lower levels of attainment.

However, overall, the empirical evidence is quite mixed. There are also papers such as Nurudeen and Usman (2010) who found that the impact of education expenditures on growth is negative.

Therefore, in this study, we intend to go one step further and seek to investigate causal relation between the employment rates with public expenditure in education.

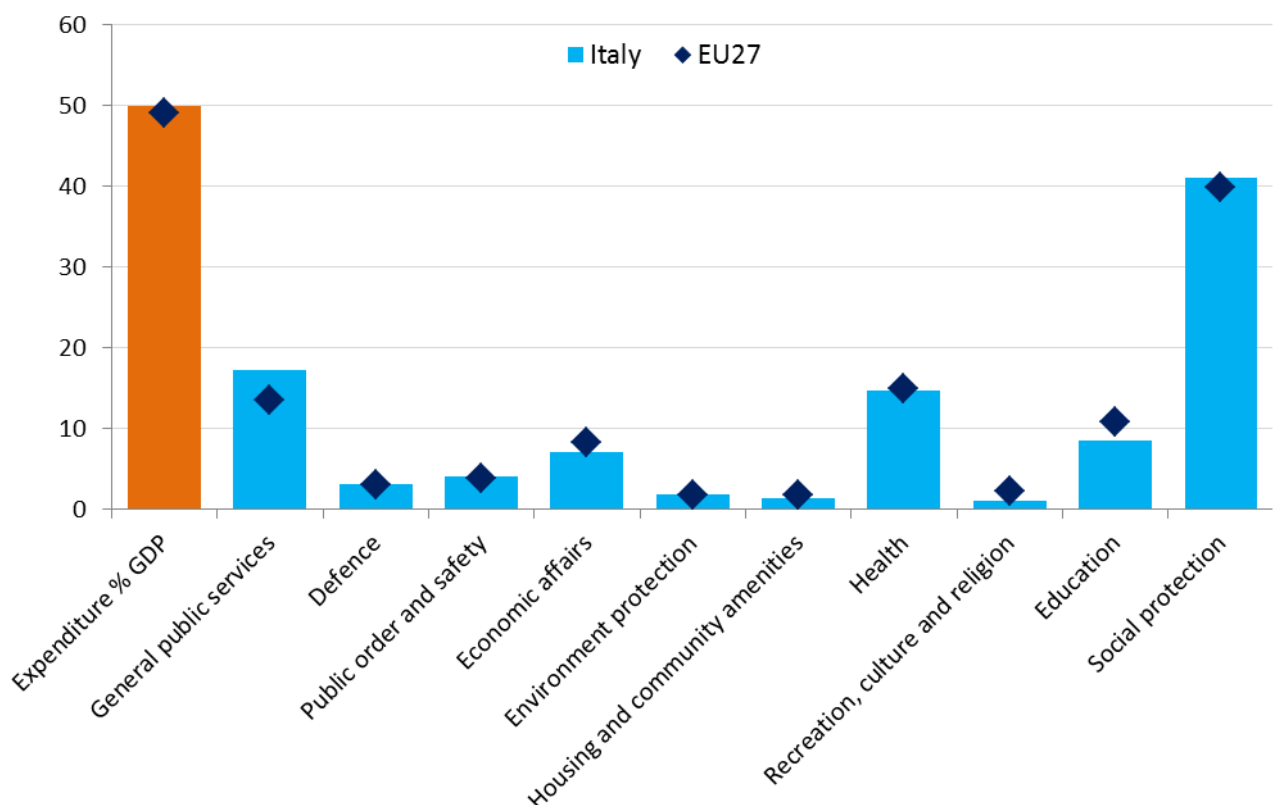
A vast literature exists on panel data methodology that has not fully exploited the time-series properties of the data.

## 2. General contest: expenditure, education and employment in European Union countries

### 2.1: Government expenditure on education

Overall, the Italian public spending in 2011 was equal to 49.9% of GDP, in line with the European average of 49.1%. What differentiates Italy is the composition of public spending, in particular with regard to spending on education and culture, considerably lower than the EU average (figure 1).

**Figure 1. General government expenditure by function (public spending as a percentage of GDP) in the EU27 and Italy - Year 2011 (percentages)**

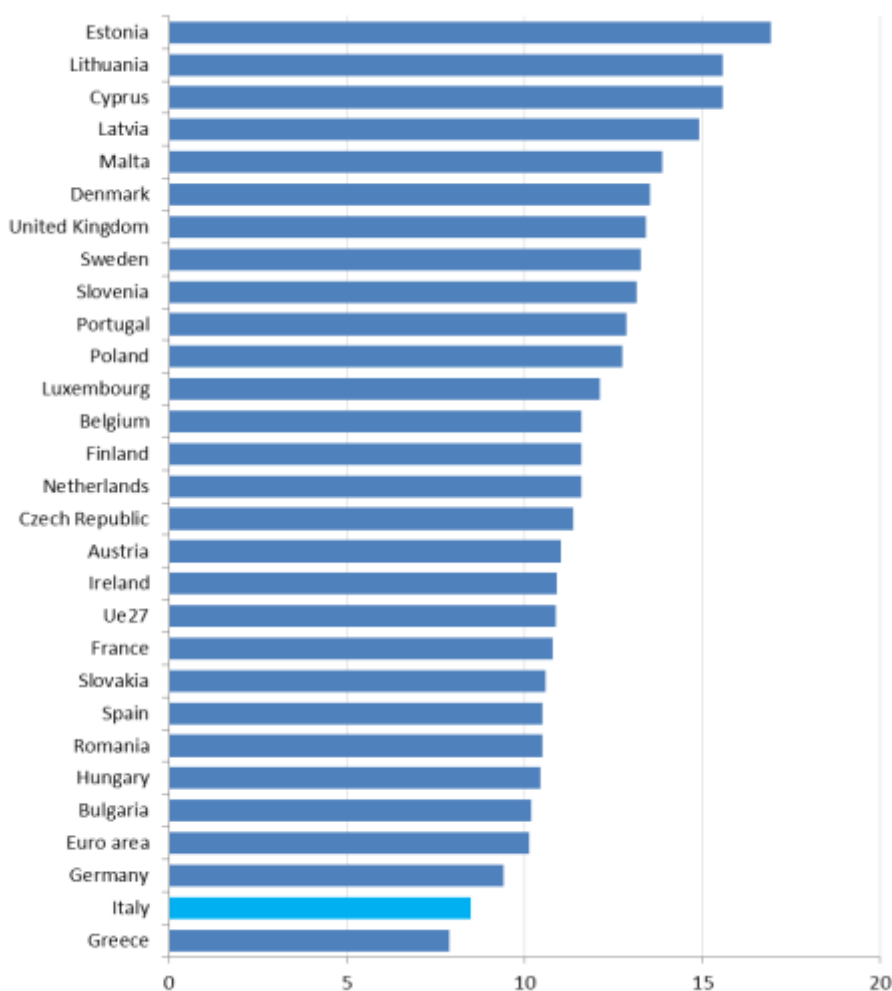


Source: Eurostat.

In Italy, in 2011, the proportion of expenditure on general public services, including the interest on the public debt, is higher compared to the EU average (17.3% vs 13.5% in EU27). Furthermore, in Italy more than half of public spending goes to Italian Social Protection and Health. Among EU countries, Italy at the bottom of the ranking for the percentage of public spending on culture (1.1% compared to 2.2% in the EU 27).

In terms of public spending on education, Italy is second lowest, followed only by Greece, as quote of Public expenditure on education (8, 5%, compared to 10.9% in EU27), as shown in figure 2.

**Figure 2. Public expenditure on education in the European Union - Year 2011 (percentage of total expenditure)**



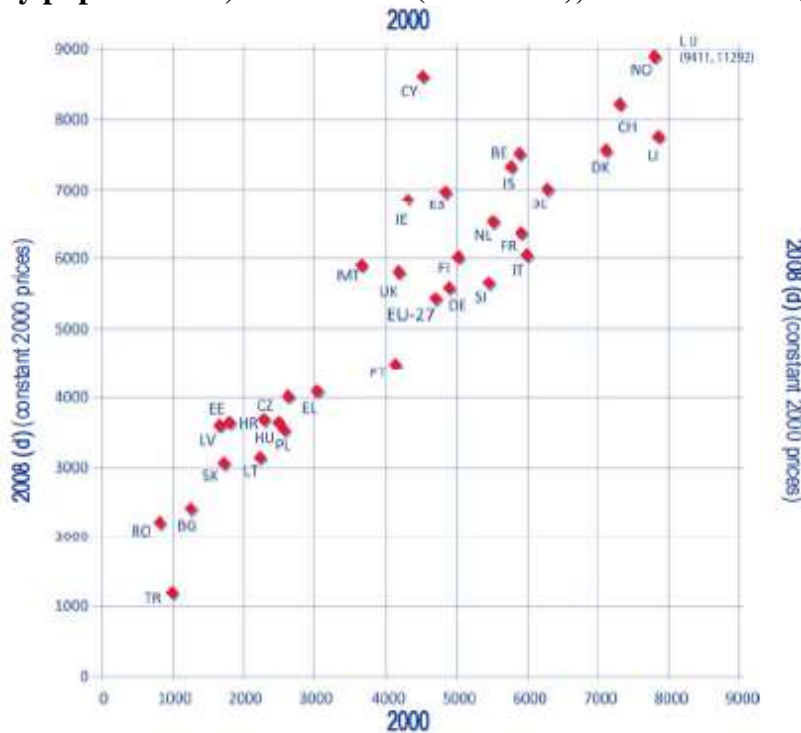
Source: Eurostat.

In the last decade, in Italy the share of expenditure on education decreased by 1.4 percentage points, while the European average remained even.

In 2008, the proportion of total public expenditure on education was more than 5 % of GDP in many of the European countries. Denmark, Cyprus and Iceland had the highest rates

at 7 % while other Nordic countries as well as Belgium and Malta stood at more than 6 %. In Italy, it was 4.6 % of GDP (figure 3).

**Figure 3: Trends in the annual expenditure on public education institutions (ISCED 0 to 6) by pupil/student, in PPS EUR (thousands), 2000 and 2008 (constant prices)**



Source: Eurostat Eurydice: Education in Europe 2012.

In nominal terms, the unit cost of a pupil/student increased during the last decade in all European countries. The total annual unit cost per student in public institutions was, on average, PPS (purchasing power standard) EUR 4 689 in the EU-27 in 2000 and was PPS EUR 6 288 in 2008 prices (PPS EUR 5 430 in 2008 at constant prices). This represents an increase between 2000 and 2008 in the total annual unit cost per student of 34 % in nominal terms. Nevertheless, when taking into account the evolution of prices over the 2000-2008 the increase in the expenditure per students was only 16 % in constant prices. In Italy it remained the same over this period, and equal to 6000 pps.

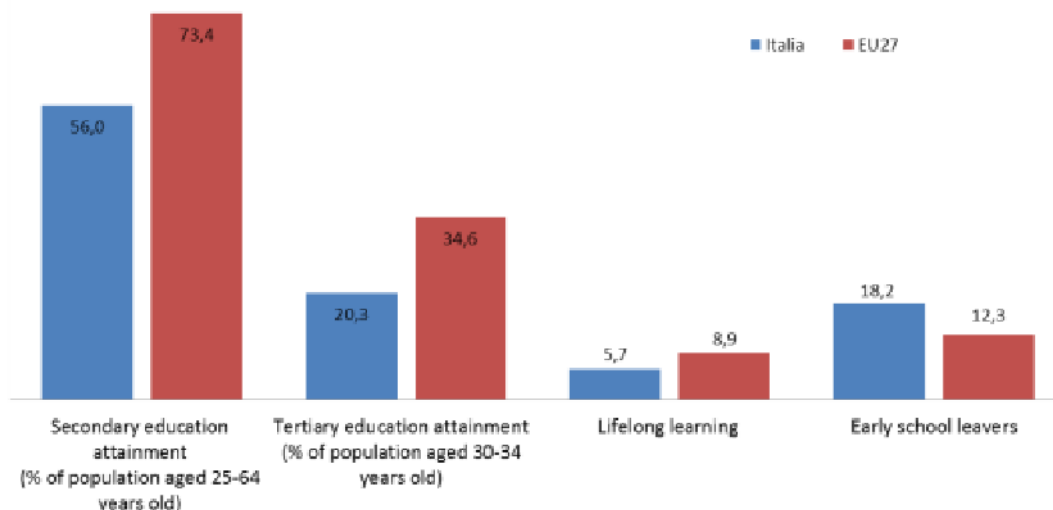
## 2.2: Education attainment in Italy compared with Eu27 Countries

Education and well-being go hand in hand, but Italy, despite the improvements achieved in the last decade, it is still behind other European countries in terms of opportunities of an adequate education.

Strong disparities between Italy and the European average are found in the main indicators regarding education attainment and lifelong learning (figure 4).

If we consider the two principal indicators used to measure the level of education of the population - the proportion of people aged 25-64 with at least a high school diploma and the share of people aged 30-34 who have completed a university degree-, it appears that Italy is at a lower level than most of the countries of the European Union (EU).

**Figure 4. Comparison between Italy and EU27 for the main indicators of education - Year 2011**



Source: Eurostat.

In 2011, 56% of people aged 25-64 have at least high school diploma compared to an average European Union of 73.4%, while the share of people aged 30-34 who have completed a university degree was 20.3 %, compared to 34.6% in the European average.

A particularly high proportion of young people leave prematurely the system of education and training, after a lower secondary level degree: in Italy, early school leavers are 18.2% of the population between 18 and 24 years, compared to 12.3% of the European average, while in 2011, eight European countries have recorded values lower than 10%, the “Europe 2020” target. Therefore, in Italy, investing in education from the very beginning of schooling process is needed.

Education should not be limited to formal education, but it has to be a process that begins before compulsory education, with the stimuli received in the family, and extends beyond secondary school or university, with lifelong learning and cultural participation.

Italy has failed to bridge the gap with the rest of Europe, and lifelong training is limited: only 5.7% of people aged 25-64 participated in education and training in the four weeks preceding the interview, compared with 8, 9% of the European average.

The proportion of graduates in the population between 30 and 34 years increased from 15.6% in 2004, up to 20.3% in 2011, but the gap with the EU27 is almost unchanged over time and equal to 14.2 points percentages.

The goal of the strategy Europe 2020 is to achieve 40% of graduates in this age group.

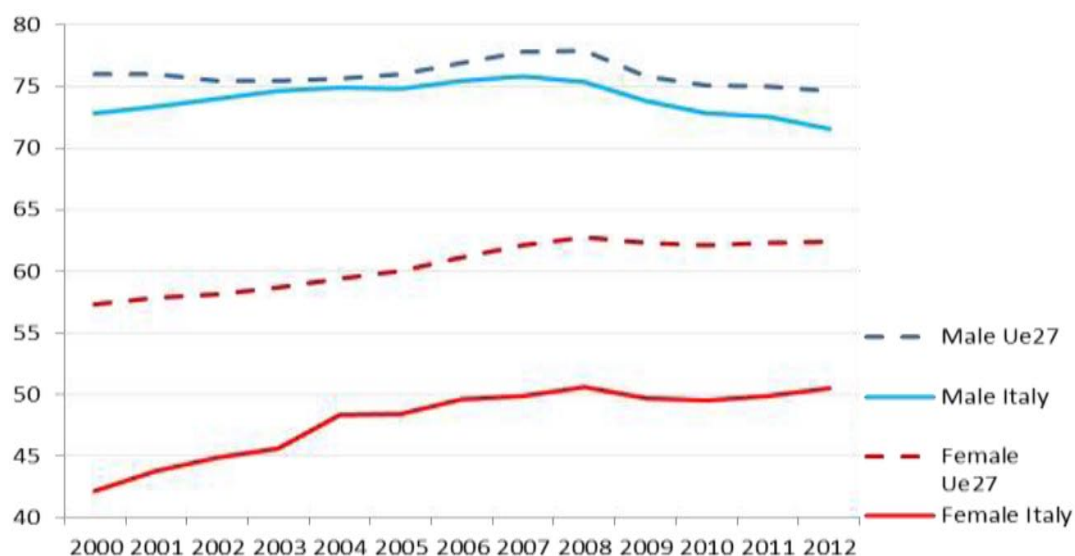
In addition, the percentage of students at the university (ISCED 5) is falling sharply, from 56% in 2006 to 49% in 2010, bucking the international dynamics: the average of OECD countries rose from 55 to 62%, that EU21 54-60%.

The percentage of University graduates among women between 30 and 34 years has increased over time, more than among men. In 2011, a quarter of young women have attained an university degree, compared to 16% of men and, in the past decade, women have been more than half of the graduates (59.2% in 2010).

### 2.3: *Employment and education in Italy and EU27*

Employment rates in Italy are lower than in the European average, as shown in figure 5. Differences are due mostly to the female component, but male employment has been hit strongly from the recent economic crisis. On the whole, employment rate is - in 2011 - 2.7 per cent lower than in 2008, while -in the last decade- women's employment has increased by less than 10 per cent. Despite the increase in female employment (uninterrupted from 1995 to 2009), the share of women in employment is still far below that of the EU (among 20-64 years old: 50.5 per cent in Italy compared to 58.5 per cent of the European average), and the gender gap in employment rates in Italy (-22 percentage points) is among the highest in Europe.

**Figure 5. Employment rate (20-64 years old) by gender in the EU27 and Italy - Years 2000-2012**



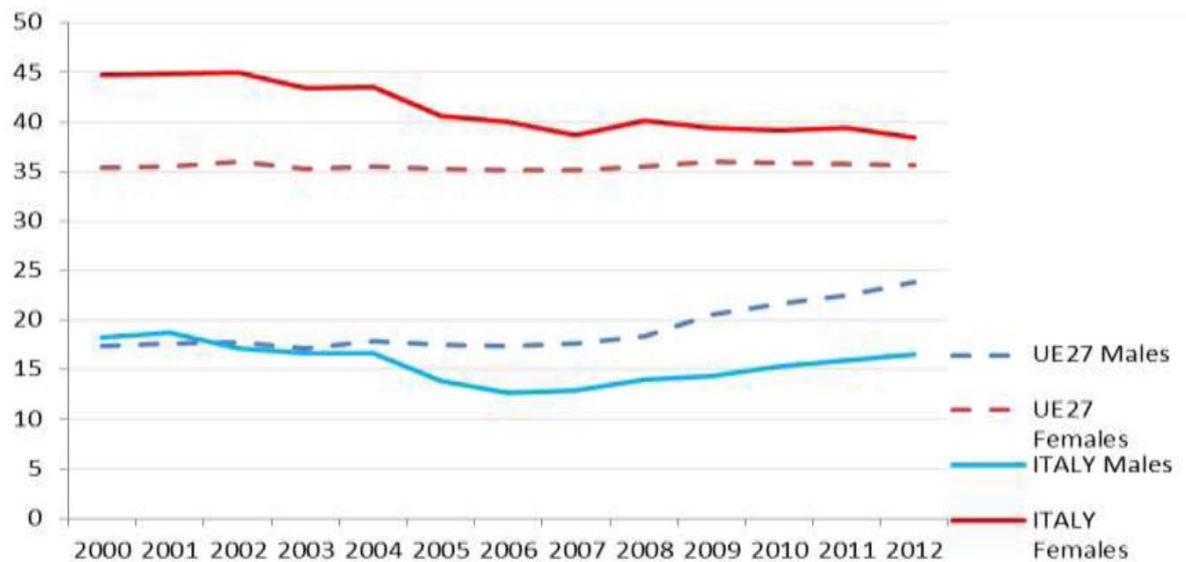
Source: Eurostat.

In Italy, education really makes the difference in female participation in the labour market: the employment rate of women with Tertiary education is more than double compared to that of women with primary education (72.3 vs 33.9).



This difference is very high also in the European average, but it is much lower among men (figure 6).

**Figure 6. Differences between Tertiary and Primary education: Employment rate (20-64 years old) by gender and highest level of education attained in the EU27 and Italy - Years 2000-2012**



Source: Eurostat.

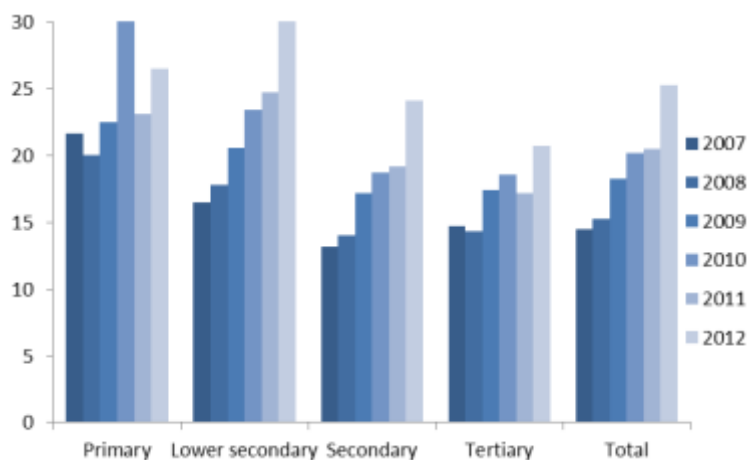
The youth employment rate, already among the most critical of the European Union, has further deteriorated in recent years due to the economic crisis: in 2011, among the 15 to 24 years old population, people looking for a job are 647 thousand, representing 10.7% of the population in this age group.

In Italy, with the recent economic crisis, the efficiency of the investments in human capital has decreased.

However, having a higher education reduces the risk of unemployment for young people: among people 15-29 years old with an University degree, in 2012 the unemployment rate was 20.7%, lower than among those with “diploma” (24.0% ) or only secondary school (30.0%).

Before the crisis, in 2007, these rates were more homogeneous, and ranged between 14.7% and 16.5% (figure 7).

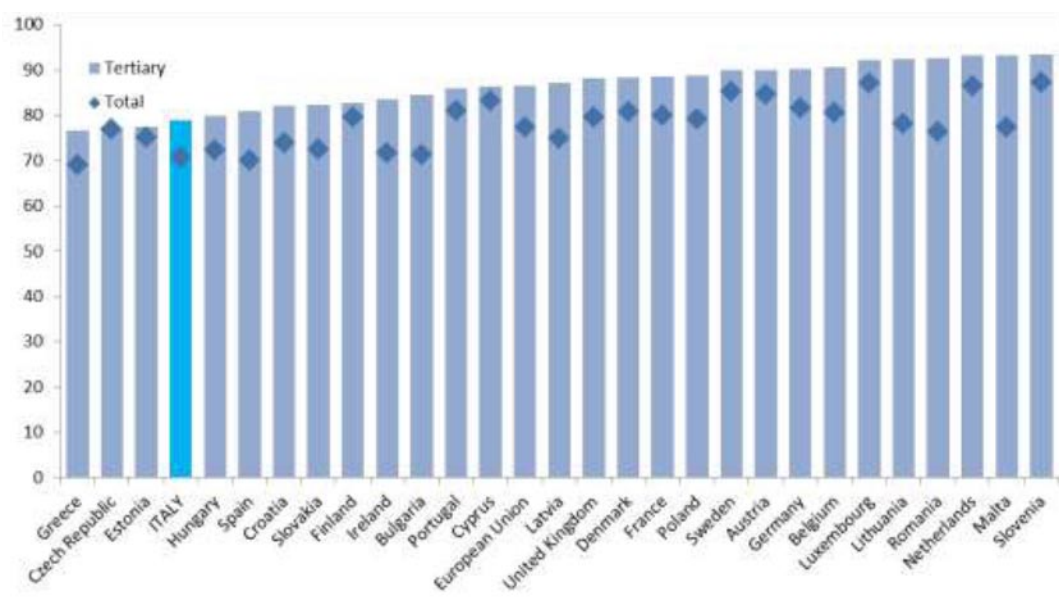
**Figure 7. Unemployment rates (15-29 years old) in Italy by education attainment (2006-2012)**



Source: Eurostat.

Moreover, the employment rate for young University graduates is 8 percentage points higher than the total, while the EU the difference is of 9 percentage points (figure 8). The comparative advantage of graduates is therefore lower in Italy than in Europe, but still remarkable.

**Figure 8. Employment rate (30 and 34 years old) for University graduates and total in Italy and Europe - Year 2011**



Source: Eurostat.

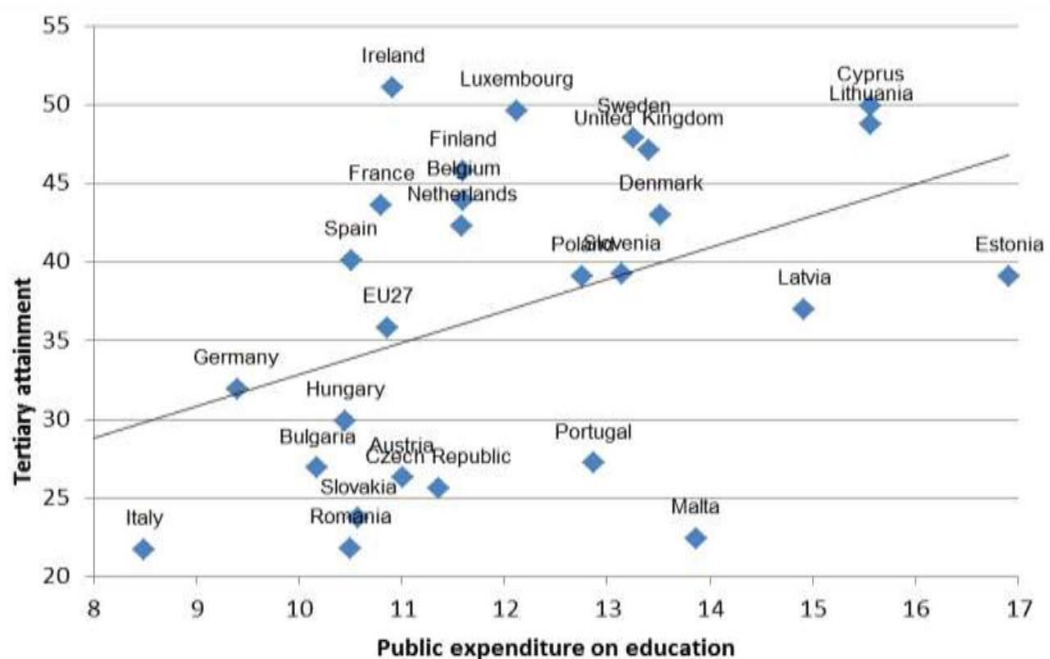
### 3. Preliminary analysis: relations of the three main variables in the European Countries

#### 3.1: Public expenditure on education and University attainment

Analysing public expenditure on education together with the proportion of 30-34 years old having achieved a tertiary degree of education (ISCED 5 and 6) it can be noted that many European countries with higher expenditure on education present also a higher quote of people having obtained an University degree (figure 9). Dividing in 4 parts the Cartesian plane, using the EU27 average as centre, on the top right can be find countries that present high level of the two variables, such as Northern Europe countries, United Kingdom and Ireland and some of the East Europe countries. Higher expenditure and lower level of education are found only in Portugal and Malta. Italy, compared with other European countries, shows both a very low quote of the population between 30 and 34 years old with tertiary education attainment and a very low value of the share of public expenditure on education.

The simple regression coefficient give indication that the relationship between Expenditure on education and University education of the population is positive (tertiary attainment= $2.0218 \times$  public expenditure on education +12.608, with  $R^2=0.1992$ ).

**Figure 9. Tertiary level attainment (30-34 years old) and public expenditure on education in the European Union (2011)**



Source: Authors' calculation on Eurostat data.

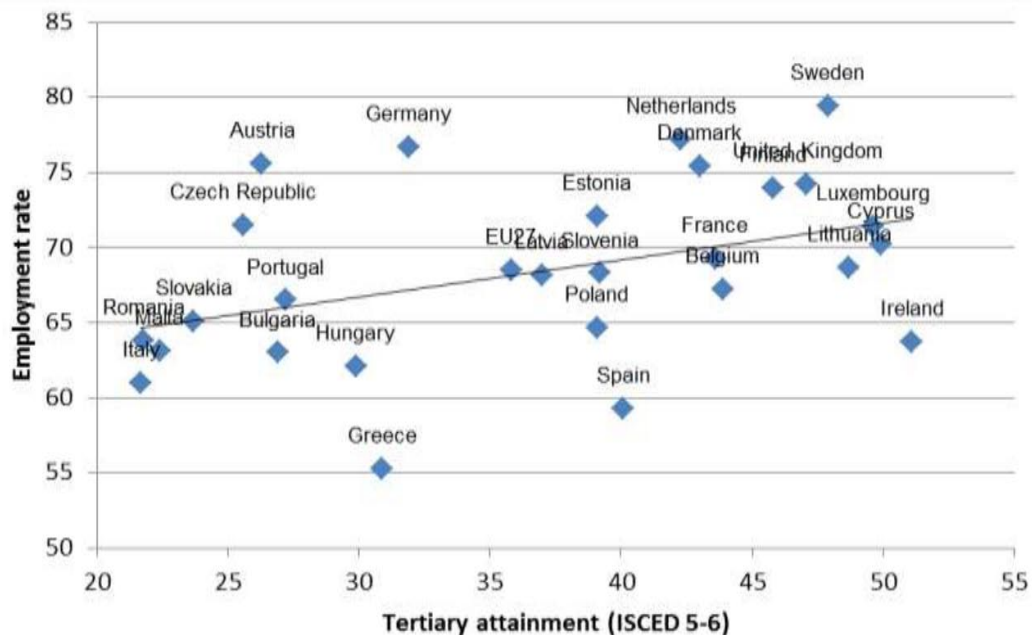
### 3.2: *Employment and educational attainment*

Considering together employment and tertiary education attainment, data referred to 2011, show also that European countries that present a higher quote of people with an university degree present also an employment rate higher than average. Countries that present an higher employment rate and tertiary attainment in the 30-34 years old population are Northern Countries and UK. Austria and Germany show a very high level of employment with less-than – average level of tertiary education attainment. Spain and Ireland have lower employment rate but a higher proportion of young people with University degree.

Italy shows again a very low level – in comparison with other European countries – of both variables (figure 10).

The simple regression coefficient on the EU27 data show that the relation of the variables is positive (employment rate =  $0.2476 \times \text{tertiary attainment} + 59.289$ , with a  $R^2=0.1648$ ).

**Figure 10. Tertiary level attainment (ISCED 5-6) and employment rate in the European Union (2011)**



Source: Authors' calculation on Eurostat data.

### 3.3: *Public expenditure on education and employment level*

Finally, taking into account the relationship between Public expenditure on education and employment rate, Northern Europe countries, United Kingdom and some of the Eastern

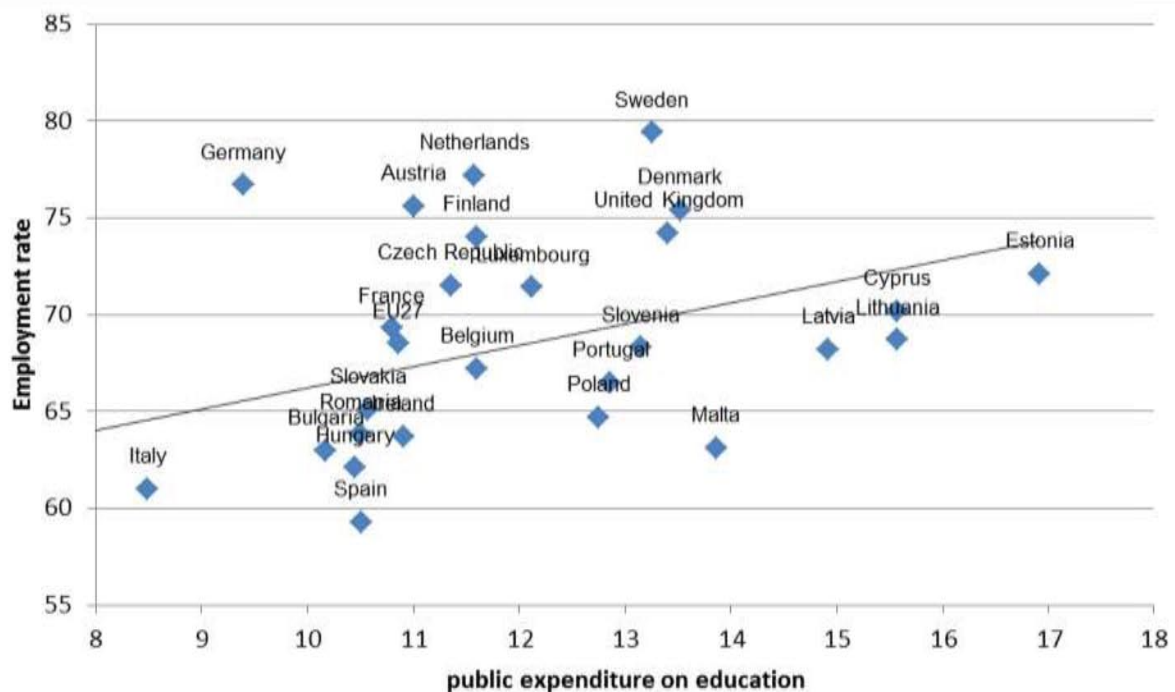
Europe countries have high level of both variables (figure 11). Malta, Portugal and Poland have high level of public expenditure, with an employment rate lower than the European average.

Only in Germany, a high employment rate is associated with a not very high share of public expenditure on education.

In Italy, very low employment rate is associated with the lowest percentage of public expenditure on education in Europe.

In a simple regression model, the employment rate varies in the same direction as the share of government expenditure on education:  $\text{employment rate} = 1.0956 \times \text{public expenditure on education} + 55.280$ , with a Square R equal to 0.1572.

**Figure 11: Employment rate and public expenditure on education (as percentage of total public expenditure) in the European Union (2011)**



Source: Authors' calculation on Eurostat data.

#### 4. Data and descriptive statistics

To test the hypotheses that public expenditure on education can boost the employment rate we have formulated a regression model, considering employment rate as the dependent variable.

The empirical analysis is conducted using the average for the period 2000 to 2011, for these variables (table 1):

-*Employment rate* (EMP), calculated by expressing the employed people as a percentage of the population aged 20-64 years old, as in the Europe 2020 targets. Only for this variable, we considered the 2012 as the reference year.

- *Public expenditure on education in (% of gross domestic product* (EDU) is the proxy for human capital and consists of current and capital public expenditure on education includes government spending on educational institutions (both public and private), education administration as well as subsidies for private entities (students/households and other private entities).

- *Education attainment*, that it is measured by population with tertiary education (UNIV) and is calculated considering people 25-64 years old, with a University degree or other tertiary attainment (ISCED 5 or 6 of the 1990 International Classification) as a percentage of the population of corresponding age.

- *Gross domestic product per capita in purchasing power parities* (GDP), that is considered an indicator of a country's standard of living and that we use as a control of the level of economic development of the considered countries.

All the variables are obtained from the Statistical databases of Eurostat.

**Table 1. Indicators for modeling (average 2000-2011)**

Country	Employment rates 20-64 (2000-2011 average)	Employment rates 20-64 (2012)	GDP PER CAPITA IN PPP	General government expenditure per education (% GDP)	Persons with tertiary education attainment 25-64
European Union (27)	68.2	68,5	22583	5.3	22.8
European Union (15)	69.3	69,4	25342	5.2	24.4
Euro area (17 countries)	67.9	68,0	24708	4.9	22.8
Belgium	66.4	67,2	27142	5.9	31.0
Bulgaria	62.3	63,0	8583	4.0	21.9
Czech Republic	71.1	71,5	17700	4.7	13.7
Denmark	77.8	75,4	28350	7.5	31.6
Germany	71.4	76,7	26275	4.2	24.8
Estonia	71.1	72,1	13575	6.5	32.8
Ireland	70.2	63,7	30725	4.9	30.5
Greece	63.8	55,3	20218	3.7	20.8
Spain	64.7	59,3	22858	4.5	27.5
France	69.2	69,3	24867	5.9	25.7
Italy	60.9	61,0	24142	4.6	12.4
Cyprus	74.9	70,2	21067	6.5	31.2
Latvia	68.9	68,2	11275	5.9	22.0
Lithuania	68.4	68,7	12417	5.8	28.7
Luxembourg	68.8	71,4	58033	4.8	25.4
Hungary	61.6	62,1	14092	5.6	17.3
Malta	58.4	63,1	18600	5.5	11.3
Netherlands	76.4	77,2	29767	5.5	29.2
Austria	73.1	75,6	28592	5.5	18.4
Poland	61.1	64,7	12233	5.8	17.2
Portugal	72.3	66,5	17883	6.6	12.7
Romania	64.6	63,8	8650	3.8	11.6
Slovenia	70.3	68,3	19258	6.4	20.1
Slovakia	65.1	65,1	14317	3.9	13.9
Finland	73.3	74,0	26042	6.2	35.2
Sweden	78.6	79,4	27958	7.0	30.2
United Kingdom	74.5	74,2	26383	6.1	31.2

Source: Eurostat (<http://ec.europa.eu/eurostat>)

## 5. The model and results

To determine the impact of education expenditure on employment the model used in this paper is:

$$EMPL=f(GDP, EDU, UNIV)$$

Based on the regression method, we obtained that the coefficient of public educational expenditure has a positive and significant relationship impact on employment rate (measured as the average of the period 2000-2011). Hence, public expenditure on education is useful as a predictor of employment rate.

This empirical evidence supports the argument that an increase of one point of public investment in human capital could have –on average - an increase of 2.14 points on the employment rate.

The other variables haven't significant relationship impact on employment rate, as shown in table 2.

**Table 2 . Parameter estimation of regression model for employment rate (average 2000-2011)**

Variable	Estimation	Standard error	T-value	Pr >  t
GDP	0.0001	0.00008	1.39	0.1776
EDUC	2.1466**	0.8621	2.49	0.0204
UNIV	0.2474	0.1265	1.96	0.0628
Costant	48.7965*	4.4548	10.95	<.0001

$R^2$  0.5232

$R^2_{adj}$  0.4610

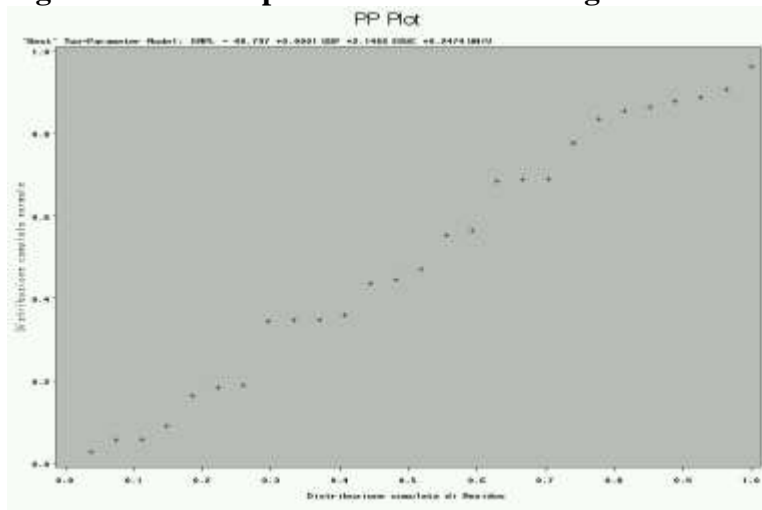
\*, \*\* means significant at 1% and 5% respectively

Based on the coefficient of determination; about 52.3% of the variation in employment rate is explained by the independent variables.

The residual plot shows a random scatter of the points (independence) with a constant spread (constant variance). The studentized residual plot shows a random scatter of the points (independence) with a constant spread (constant variance) with no values beyond the  $\pm 2$  standard deviation reference lines (no outliers). The normal probability plot of the residuals shows the points close to a diagonal line; therefore, the residuals appear to be approximately normally distributed.

Thus, the assumptions for regression analysis appear to be met.

Here we report only the PP Plot from the regression output (figure 12).

**Figure 12. The PP plot for the residual diagnostic**

Similar results have been obtained considering, as the dependant variable, the 2012 value of the employment rate.

Also in this model, the public expenditure on education shows a significant regression coefficient, indicating that to an increase of one percentage point in public expenditure on education could correspond— on average – an employment rate two points higher.

The other variables haven't significant coefficients.

**Table 3 . Parameter estimation of regression model for employment rate (2012)**

Variable	Estimation	Standard error	T-value	Pr >  t
GDP	0.0002	0.0001	1.61	0.1213
EDUC	2.4612**	1.0479	2.35	0.0278
UNIV	0.1504	0.1538	0.98	0.3384
Costant	47.8201*	5.4154	8.83	<.0001
$R^2$	0.4200			
$R^2$ adj	0.3444			

\*, \*\* means significant at 1% and 5% respectively

## 6. Conclusions

In this study, we set out to empirically investigate the relationship between public education expenditure, education attainment, and employment rate.

This paper has highlighted that the relationship between public education spending and employment rate in the 27 European Union countries in the period 2000-2011 is essentially positive and statistically significant.

Hence, the results provide support for the validity of the hypothesis, that – in countries where investments in education have been higher –in average over the past 10 years – also the employment rate has been higher.

On the contrary, national wealth –measured by per capita GDP – has not resulted significant in the model.

Therefore, it appears that investing in education has a positive effect on employment rate, regardless of countries' economic wealth.



Moreover, although Tertiary education attainment is very important as individual investment, our outcomes seem to indicate that investing only in University is not enough and that, therefore, expenditure in education should be spread on all the level of education.

The results of the model give also indication that the positive relationship between public education expenditure (used as a proxy for human capital formation) and employment rate could be even stronger for economies which are in their early phase of development.

Further investigations could be carried out taking into account the way resources are spent, considering, for example, expenditure for teachers rather than other components.

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