The Determinants of Youth Unemployment. A panel data Analysis

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Abstract[*]

The school-to-work transition represents a long dark tunnel for too many young people all over the world. Nonetheless, cross-country differences are striking: in Germany, young people fare no worse than their adult counterparts, while in the South- and Eastern-European Union countries young people fare from 3 to 4 times worse than their adult counterparts. This essay points to the youth experience gap as a key concept: countries dramatically differ in their strategies to cover the youth experience gap, which remains high even in a time of ever increasing education attainment. Five different country groups are detected whose outcomes in terms of youth unemployment are dramatically different: a) the North-European; b) the Continental European; c) the Anglo-Saxon; d) the South-European; e) the New Member States. For the first time, this essay provide evidence based on panel data analysis. Our final specification is a dynamic model with control for endogenous variables to explain the role that different educational systems vis-à-vis labor market institutions have in affecting the youth absolute and relative disadvantage. We find that the European Continental and the Anglo-Saxon system perform much better also after controlling for per capita GDP level and growth, as well as for labor market and educational institutions.

JEL Classification: H31, H52, I2, J13, J24, J68,
Keywords: Youth Unemployment, Youth Experience Gap, School-to-Work Transition Regimes, Dynamic Panel Data Analysis; System GMM.

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[*]Acknowledgements. This paper has been presented in a number of occasions: seminar at the TEALM summer school (University Parthenope of Naples, May 2014), ELTE Economics Department (Budapest, May 2014), XIX AISSEC Conference (Macerata, June 2014), XXIX AIEL Conference (Pisa, September 2014), University of Ljubljana (September 2014). We thank all seminar participants, especially Floro Ernesto Caroleo, Daniel Horn, Janos Köllo. We also thank Roberto Basile, Sergio Destefanis and Enrico Marelli for useful suggestions and comments on earlier drafts of this paper. However, the responsibility for the remaining errors belongs only to the authors.

Introduction

This paper is in the spirit of some enquiries of the role of different labor market institutions in explaining the gap in the aggregate unemployment rate across countries (Nickell, 1997; Nickell, Nunziata and Ochel, 2005; and Bassanini, Nunziata and Venn, 2009). These studies invariably emphasize the role of labor market institutions and especially of the employment protection legislation.

However, we focus on young people and therefore on the factors which affect their specific performance in national labor markets. The school-to-work transition (SWT) represents a dark long tunnel for many young people all over the world. Nonetheless, it is not the same problem in every country. In some countries, such as Germany, young people have the same probability to be employed as the adults have while, on the contrary, in Mediterranean countries this probability is lower. The disadvantage of young people raises above all from their "experience gap".

As noted in Pastore (2015), the "youth experience gap" is the gap in work experience existing between young and adult workers. Countries follow a different path as to the ways of reducing this gap throughout the educational system and the ensuing school-to-work transition. There are countries that in order to reduce this gap sooner use the dual education principle (DES), that ensures many high school students to have at the same time general education *and* formal training within the apprenticeship system. This educational system is designed so to reduce the above-mentioned "youth experience gap" already while at school.

The red line of this paper is using econometric analysis in order to empirically test the hypothesis that the DES is the best school-to-work transition regime (SWTR) to reduce the youth unemployment rate (YUR). The YUR is the dependent variable and SWTRs are independent variables, together with a number of macroeconomic and institutional control variables. We consider 5 SWT regimes: a) North-European (Finland, Sweden); b) Continental European (Belgium, Germany, Austria, Netherlands, Denmark, France, Slovenia); c) Anglo-Saxon (UK, Ireland); d) South-European (Greece, Italy, Portugal, Spain); e) New EU Member States (Poland, Slovakia, Hungary, Estonia and Czech Republic). The hypothesis behind this dummy variable approach may be questionable because our SWTR dummies might catch other relevant factors, which the other control variable are unable to catch. Unfortunately, as discussed in detail in the methodological section, there are no national level data on the main features of a SWTR, which prevents us from measuring their specific role.

We control for different confounding factors, which, if not adequately taken into account, could represent explanations of the YUR gap across countries, which are alternative to SWTRs.

The expected betas per capita GDP level and growth are similarly negative, although for different reasons. The share of Youth and Active Youth population may generate a bottleneck effect therefore reducing the chances of employment. An increased share of secondary and tertiary education attainment might partly explain the YUR gap across countries, because education should give to young people the skills necessary to deal with the world of work. PLMP and ALMP are expected to have a negative and positive beta, respectively, since the former should increase the employability of young people and the latter increase their reservation wage. The Employment Protection Index (EPI since now) is expected to yield a positive beta by reducing the tendency of firms to hire new workers, rather than increasing the effort of the hired ones.

To our knowledge, this is the first empirical investigation to test the above theoretical hypothesis within the context of panel data analysis. We collected longitudinal aggregate data relative to 21 countries observed over a period of 10 years (from 2001 till 2011), for a total number of 231 observations. Information was collected on around 97 variables relative to the youth labor market, although due to many missing observations, some countries and variables could not be used.

The relationship between SWTRs and the YUR is going to be investigated in the context of static as well as dynamic panel estimates. We use the LSDV (Least Square Dummy Variable) estimator since the Hausman (1978) specification test confirms that the fixed effect model is to be preferred to the random effect model. Expected results include: SWTRs have a ceteris paribus statistically significant impact on the YUR. In particular, the dummy relative to the Dual Educational System (DES since now), relative to continental European countries, is expected to be the one which presents a statistically significant and negative beta, meaning that ceteris paribus DES is the best educational system as compared to the others in reducing the YUR. In fact, we are expecting a negative beta of the dummy for dual system countries, greater than the one for the Anglo-Saxon countries. The worst performing countries are expected to be those belonging to the Mediterranean and East European educational system, with the Scandinavian countries being in the middle.

According to Roodman (2006; 2009) with a small T and a large N, a linear functional relationship, single left hand side variable that is dynamic (depending on his own past realizations), fixed individual effect and some independent variable strictly exogenous the "persistence" over time the GMM estimator can be used in order to conduct the analysis. The estimation model to use is the Arellano-Bond dynamic panel, confirming the statistical significance of the results, also in a dynamic context. The results of system GMM estimates allow stating the causal nature of the relationship considered. In fact, all GMM beta's coincide

in sign with the previous findings obtained from LSDV estimation. Moreover, looking at the hysteresis of the YUR, the system GMM estimation tells us that the higher was the YUR in the past year, the higher will be the YUR in the present.

The paper is structured as follows. Section one presents some stylized facts regarding the YUR across SWTRs. Section two brings to the fore the our theoretical framework and defines the hypotheses to be tested in the empirical analysis. Section three illustrates the methodology and section four discusses the data used. Section five presents the results of descriptive as well as static and dynamic panel data analysis. Some concluding remarks follow.

1. Key stylized facts

The discrepancies in YUR across countries are, in large part, due to the educational and training system and, moreover, to active labor policies in the various countries.

The Scandinavian countries (Finland, Sweden, Norway), for example, have a sequential system of education, whose mission is only to provide general education, while work experience should be made after school. Thanks to pro-active schemes on a large scale, given within four months from the beginning of the unemployment spell, the state helps young people to build their skills at the end of their school career.

In contrast, in continental European countries (Germany, Austria, Switzerland, Denmark, Holland, France), the education system is dual. It takes as its mission not only to generate general education, but also on-the-job professional training, to be carried out during the course of study and not after, as is the case instead in sequential educational systems. This implies that, just after graduation, young people are ready to enter the labor market. Not surprisingly, these countries have always had a low unemployment rate and a very low relative disadvantage.

Anglo-Saxon countries (Canada, New Zealand, UK, USA, Australia, Ireland) have a (sequential) system of education of high quality. The flexible labor market provides labor contracts with a low firing cost for firms; this allows companies to hire workers more easily, without worrying for the long run prospect, and therefore allows young people to develop work-related skills. In these countries, the youth unemployment rate is relatively low while the relative disadvantage of young people is high, but weighs less, since it corresponds to low average unemployment rates, except during the crisis.

Mediterranean countries (Portugal, Spain, Greece, Italy) have an inflexible and sequential education system. The reforms at the margin have made the labor market more flexible, reinforcing the strong segmentation between insiders and outsiders. Often, the most effective way to find work is recurring to the individuals' informal network of family and friends, since

the labor market infrastructure is underdeveloped (public and private employment agencies, schools and universities) or declining (public competitions). As always, the youth unemployment rate is very high and also the relative disadvantage.

Finally, the new European Union member states (Poland, Slovakia, Hungary, Estonia, Czech Republic) have increasingly flexible labor markets and growing levels of spending on active and passive labor market policies. The youth unemployment rate is still high.

Which of these groups of countries faced the crisis better? To answer this question, we compare the absolute (unemployment rate), and "relative" (ratio of unemployment among young people and adults) disadvantage of young people in the different regimes before and after the crisis.

[Figure 1 about here]

The Central European, Anglo-Saxon and Scandinavian countries have seen relatively low youth unemployment rates in 2000. With the crisis, though, unemployment has increased while in the Mediterranean countries and the new member states, youth unemployment seems to be, at least initially (2008) slightly decreased. The reason is that the reforms at the margin carried out recently had increased temporary employment. 2012 is a critical year for everyone, but with important differences. The most flexible countries did worse than others. This is the case of both the countries belonging to the liberal tradition, such as the Anglo-Saxon countries, and the Southern and Eastern European countries, which had adopted the so-called reforms at the margin, reducing the costs of hiring and firing only for the new hires.

In terms of "relative disadvantage", young people in Central European and Anglo-Saxon countries seem to be doing better than their peers in the other groups of countries. It should be noted also that in 2012 there is an improvement in the ratio as compared to 2008, caused by the relatively higher unemployment rate of the adults. Still the ratio remains above the starting level of 2000, though.

[Figure 2 about here]

The reduction in the relative youth disadvantage is apparently surprising to those accustomed to consider the cyclical nature of youth unemployment. Typically, in fact, companies adopt the last-in-first-out principle, firing the last to arrive, namely the youngest workers. However, when the crisis is deep and prolonged like the current one is, firms are forced to fire also the adults, which reduces the relative disadvantage.

In the long term, in order to reduce youth unemployment in the Mediterranean countries, far-reaching reforms of education systems should be carried out to introduce the dual principle. In recent times, something is moving in this direction. For instance, France has adopted a dual system of education. In Italy, the reform of apprenticeship was implemented in 2011.

In the short term, however, the program called Youth Guarantee should allow countries that have youth unemployment rates higher than 25% to obtain funds for active employment policies; apprenticeship, training, and paid internships in the company for the under-25. If well implemented, this program could help to reduce the disadvantage of young people, but there are many conditions to be met. One of them is a relaxation of the Maastricht criteria per public deficit that is able to foster economic growth. Another one is a dramatic reform of the public and private employment services in Southern and Eastern European countries.

2. The "Youth Experience Gap"[1]

"An overriding reason for young being held back is a lack of skills relevant to the workplace" (McKinsey 2014, p. 1). Of the large number of firms which were surveyed by the McKinsey Center for Governament, 61% "*were not confident they could find enough youth applicants with the right skills to meet their business needs"* (McKinsey 2014, p1). According to Gomez-Salvador and Leiner-Killinger (2008) one of the major determinants of youth unemployment is the gap between youth's qualification and the work skills required. This gap that young people have to fill is one of the main reasons of their hardship in finding the right job for them. In the literature, it is called the "youth experience gap" because the gap can be filled in only through a work experience able to develop the basic human capital that young people have accumulated with in education (Ryan, 2001; O'Higgins, 2001; Quintini et al. 2007; Pastore, 2015).

The youth experience gap is the gap in work experience existing between young and adults workers. Young workers have a level of human capital and therefore of productivity that is lower than that of the adult which, ceteris paribus, makes employers prefer the adult people to young people. The gap between young people and adults is even greater if we focus on two components of human capital, namely generic and job-specific work experience.

Young people, who understand their negative gap, have the goal to reduce it, through work experience. For this reason they move from a job to another in order to find the job that best fit their skills and abilities, namely the "best job-worker match". That is why in and outflows from unemployment for young people are higher than for adults, as of Clark and Summers (1982) found for the first time. To be more precise labour market flows change because: a) young people are in search for their best job-worker match; b) and often they go back to education and training after an employment or unemployment spell; c) this is especially true for low skill young people; d) employers are also in search for the best worker match.

[1] The theoretical framework laid down in this section is a summary of Pastore (2015).

2.1. The mainstream approach

It should be now clear that youth unemployment should be a temporary problem, provided that sooner or later young people will be able to fill their experience gap. Since youth unemployment depends on their experience gap and the pursuit of the "best job-market match" than what really matters for young people is, according to liberalist economists, only the flexibility of the labour market. This thesis has been uttered, for instance, in the famous OECD (1994) Job Study.

Why? Because the more flexible is the labour market, the more young people are able to pass from a job to another, the more "inexperience gap"- pass me this term- decrease. Now, if what has been said above is correct a policy maker has two strategies in order to achieve labour market flexibility.

The first way is to increase the probability for young people to find a job, once (s)he become jobless. Some mainstream economists argue that the longer is the length of unemployment, the lower is the probability of becoming employed.

Why does this happen? First, because the more a young person remains unemployed, the more (s)he is losing his/her skills. Second, of course, human resources (HR) during an interview take into account the time a person has been unemployed. The more a young person has been unemployed, the higher is the signal of low motivation to work that (s)he is transmitting to the interviewer.

In a nutshell, a labour market policy maker should provide young people with more opportunities to training using temporary work. In fact, there are several advantages linked to temporary work according to Loh (1994), Booth, Francesconi and Franck (2002), Ochel (2008) namely:

a) temporary-work is a stepping-stone for young people to find their best job worker match;
b) employers pay low wages for low productivity;
c) employers have the opportunity to "try" young people;

Another important aim for policy makers is to contrast wage-setting mechanisms at a national level, such as the minimum wage and incomes policy. They assign, in fact, the same wage to all people, independent of their skills, age or specific techniques on the job. In this picture firms are more reluctant to hire a young "inexperienced" young person, because (s)he will produce less compared with an "experienced" adult. A solution could be lower entry wages for the lower productivity and lower work experience of young people.

Another aim for policy makers, could be the reduction of hiring and firing costs for firms wishing to hire young people.

2.2. Weakness of the mainstream approach

This is quite an optimistic view about the youth unemployment problem, but there are two formidable arguments against the use of labour market flexibility and temporary work as the only solution to the youth experience gap.

The first one could be attributed to Heckman and Borjas (1980) and Heckman and Singer (1984). In fact they demonstrate that the probability to find a job at a given time is not any more negatively related in a statistically significant way to the duration of the unemployment spell, but becomes flat. Long-term unemployment appears to be the consequence of the low motivation and skills of the unemployed rather than of the time spent in unemployment itself.

In other words, the labour market policies seen above could affect only the portion of youth unemployed really wishing to work-namely the "motivated youth"- .

Giving a closer look at those "young motivated" it could come out that they are not yet employed because they are enriching their solution.

Anyway, it is obvious that among young people, some of them, owning often a lower than average education level, will still find a job due to greater social capital, "informal" network of their household, the availability of their own business and so on.

A policy maker, perhaps, should take care also of the least motivated, helping them in finding a job by implementing employment policy in general and active labour market programs in particular in the short run. In the long, the best solution would be to increase their educational level and the skill level they possess.. To the policies seen before there is an interesting view that Gary Becher, the Nobel prize winner, shared.

He agree that temporary work could be a solution to reduce the experience gap, but then he focuses on job specific work experience arguing that reducing wages, linked to fixed –term work, could not be the right thing to do because employers would still prefer an "experienced adult" to a "first-job young person" if deciding for a specific job. On the other side the short fixed-term contracts and the low entry wages could represent a strong disincentive for young people to invest a job specific competences.

In this context, formal training is more important than lower wages or short-term employment experiences if one wants to raise employability.

The things we said so far should bring us to the conclusion that sometimes those fixed time jobs could be stressful, for young people, forcing sometimes them into low-pay trap.

To be more precise what happens to young people is that they tend to accept low pay jobs remaining trapped in this condition for years sometimes for the rest of their life instead of accumulating work experience, year by year, in order to reduce their "experience gap". However, it is only in the latter way that they could manage to find a more profitable work position under two characteristic: the wage and the quality of work.

Nowadays, it is central to the debate to ask whether temporary work should be considered as a stepping- stone (that will bring you more and more near to the "best job-worker match") or a dead-end jobs. According to Bassanini, Nunziata e Veen(2009), the OECD is trying to shift the debate from the flexibility/rigidity debate towards the definition of the optimal mix of regulation to make temporary work more effective in providing training and job opportunities that are for young people.

The answer could be a mix of different instruments which depend not only on the degree of labour market flexibility but also of educational, training educational, training and, more generally, welfare systems and the system of fiscal incentives to hire the weakest groups of young unemployed.

2.3. Educational systems

According to Hammer (2003), Caroleo and Pastore (2003) and Pastore (2015), educational systems differ in the way they try to fight youth unemployment. They can be:

- rigid vs. flexible
- dual vs. sequential.

Whereas rigid educational system do not allow young students to pass from a curricula to another and require long time to allow getting a degree. A sequential educational system is so called because a person first has to graduate and then (s)he will look for a job.

The perfect match between the previous two features is the dual system that ensure students to have at the same time general education and apprenticeship.

Similarly, welfare systems differ according to:

- the relative share of pro-active versus passive income support schemes;
- targeting and scale of expenditure;
- state- versus family-based welfare systems;
- the size and types of fiscal incentives to hire young people.

2.4. Different school-to-work transition regimes

Following Vogel (2002) and Pastore (2015), based on the mix of characteristics of their social policy, relative to the educational, training and welfare system, European countries can be grouped into different school-to-work transition regimes:

North-European: The educational system is flexible and sequential, even if the flexibility of the overall labour market is generally low. Agencies for employment are really used in those countries and they are optimum as job search. These countries are characterized by an high level of unionization. The mean feature of this system is that relies on a very well developed welfare state system. Passive income support schemes are available for unemployed. Active labour market policies are implemented on a large scale. Youth unemployment rate is relatively low compared with the average of European countries. On the other side, the relative disadvantage computed as youth unemployment on adult unemployment is relatively high.

Continental European: The educational system used is the dual system, that as explained earlier is particularly efficient because, taking the example of Germany overall, it gives the possibility to young people after compulsory schooling to choose whether to attend a general high secondary school or a vocational school and to go, then, into apprenticeship program. The main features of those countries is that they always showed a low unemployment rate and, overall, Germany and Denmark showed the lowest relative disadvantage.

Anglo-Saxon: The educational system is flexible and sequential. Flexibility comes from low firing and hiring costs due to the fact that in those countries even the little job needs a fixed-term contract. Unionization used to be very high in the past, while now it is decreasing. The bargaining wage is very high decentralized. Job agencies are for the great part private. Apprenticeship is available to everyone; passive income support is available to the weakest group but people have to demonstrate that they are actively looking for a job. The youth unemployment rate is relative low being almost 10 % compared with the rest of the Europe countries. Also the relative disadvantage of young people is low being around only 3.5.

South-European: The educational system is rigid and sequential. A typical educational system for those countries is the Italian one. The best way to find a job is in those countries the Word of Mouth. Young people often rely to the “informal” network of family and friends. Until the consolidate act of 2011, apprenticeship was forbidden. Now, it seems to be reinforced after this act was signed. Today, something seems to be better off. These countries have shown for years the highest unemployment rate among European countries and also the highest relative disadvantage.

New Member States: the feature of this cluster is that the Labour market are becoming more flexible (even if still rigid if compared with the Europe), expenditure in active and passive

policies has increased. In the recent years "3+2" reform has been implemented. The debate shifted, during this period, focusing on why, even with excellent education, the youth unemployment rate is still high.

This classification largely overlaps with that elaborated by Esping-Andersen (1990) for the welfare systems of old member states, emended to include also the Latin Rim and the new member states (Burlacu, 2007).

3. Methodology

3.1. The empirical models

The main aim of this paper is to demonstrate that the youth disadvantage, both the absolute and relative disadvantage, depends on the mismatch between the skills required by the labour market and the skills that the potential workers have after completed education. This is what the previous section has defined as the youth experience gap. The youth unemployment rate (YUR) measures the absolute disadvantage and the ratio of the youth to the adult unemployment rate measure the relative disadvantage (RD). Obviously, other factors are at work. For instance, the crisis period further exacerbated an existing problem also in countries where the YUR has particularly soared with the crisis, such as South and East European countries. Therefore, the simple question we ask is whether there is still a statistically significant role of SWT regimes after controlling for all the macroeconomic and institutional factors for which statistical information is available at a country level. This type of estimates is plagued by several specification problems, which we address in the rest of the section.

If the YUR and the RD depend on a lack of skills in young people, the education system or, better, SWT regimes should matter. In fact, it should be a mission of schools and universities to prepare young people to be prepared to the needs of the labour market. However, as theorized in Ryan (2001) and Raffe (2008), among others, a school-to-work transition model includes not only the education system, but also all the institutions which supervise the process, including according to the country, public and private employment services, training institutions, employment protection legislation, trade unions and entrepreneurial organizations, ad so on. Overall, SWTs are very similar in some groups of countries, rather than being totally different from one country to another. Different types of regimes have been identified in the literature. Following this line of reasoning, the baseline model for estimation is:

$$YUR_{it} = \alpha \sum_{s=1}^{5} SWTR_{it}^{s} + \beta \sum_{x=1}^{n} X_{it}^{x} + \varepsilon_{it} \qquad [1]$$

where SWTR is a set of s=5 school-to-work transition regimes, X is a set of n control variables. Following Pastore (2015), they are: a) North-European System (D_NE: Estonia and Sweden); b) Dual-Educational System (D_CE: Belgium, Germany, Austria, Netherlands, Denmark, France, Slovenia); c) Anglo-Saxon system (D_AS: United Kingdome and Ireland); d) South European System or PIGS (D_SE: Greece, Italy, Portugal, Spain); e) New Member State System (D_NMS: Poland, Slovakia, Hungary, Estonia and Czech Republic). We expect that some SWT regimes perform better than others not only in unconditional terms, but also after controlling for a number of other variables of interest, such as the per capita GDP level and growth, as well as such institutional factors as the degree of employment protection, the evolution of population size and migration, the level of education attainment, the expenditure in passive and active labor market policy. A detailed definition of all the variables is contained in Table 1.[2]

[Table 1 about here]

The hypothesis behind this dummy variable approach to catching differences in SWTRs may be questionable because our SWTR dummies might catch such other relevant factors as the degree of technological innovation of firms, especially in the manufacturing and tertiary sector, as well as the degree of diffusion of new technologies, especially the information & communication technologies, associated more frequently with a graduate workforce. Nonetheless, we do our best to catch other relevant factors with the other control variables. A bottom line of this paper is that international organization in charge of developing comparable cross-country statistical information should put much more effort in collecting information regarding the way SWTR are organized, because the performance at the labor market of young people dramatically depends on the way SWTRs are organized.

3.2. Static panel data analysis

This type of estimates are plagued with a number of specification problems. In order to conduct robust estimations, two estimators can be used, namely the fixed-effect (FE) and the random-effect (RE) models. In the FE:

$$y_{it} = \alpha_i + \beta X'_{it} + \varepsilon_{it}$$

[2] The absolute and relative disadvantage may have a different dynamics. We therefore also estimate the same equation using as dependent variable RD, although, for shortness' sake, we do not present the results here.

$$RD_{it} = \alpha \sum_{s=1}^{5} SWTR_{it}^{s} + \beta \sum_{x=1}^{n} X_{it}^{x} + \varepsilon_{it} \qquad [2]$$

where y_{it} is the dependent (endogenous) variable, $\alpha_i$is a time invariant individual effect - it measures the effect of all the factors that are specific to individual *i* but constant over time, X'_{it} is a row vector of observations on K explanatory STRONGLY EXOGENOUS[3] factors for each i at time t , not including the constant term. β is a column vector of K parameters , ε_{it} is an i .i .d . error term such that E[ε_{it}]= 0.

In our sample the FE model will take this form:

Yur_{it}=$\alpha SWTR_{it} + \beta X_{it} + \varepsilon_{it}$

Where SWTR is a dummy variable that can take the value 1 if it represent a certain school-to-work transition regimes or 0 otherwise. X_{it} is a set of control variable.

The random effects model is an alternative to the Fixed effects model. The estimation equation is the same:

$$y_{it} = \alpha_i + \beta X'_{it} + v_i + \varepsilon_{it} = \alpha_i + \beta X'_{it} + \omega_{it}$$

The equation I am going to estimate is :

Yur_{it}=$\alpha SWTR_{it} + \beta X_{it} + \omega_{it}$

However, contrary to the Fixed effects, the random effects are assumed not to be estimable-in contrast with Fixed Effect that can be estimated-; they measure our **individual specific ignorance** which should be treated similarly to our **general ignorance** ε_{it}. ω_{it} is the composite error term, and is not correlated with regressors: E($\omega_{it}, x_{it,k}$) $= 0, \forall\, k$ and, a feature is that assume a specific form of covariance structure of the two types of error terms.

The natural question that arises after introduction of RE and FE models is: Which one should we use? The specification test devised by Hausman (1978) is used to test for orthogonality of the common effects and the regressors. The test is based on the idea that under the hypothesis of no correlation, both OLS in the LSDV model and GLS are consistent, but OLS is inefficient (H_0), under the hypothesis of correlation, OLS in the LSDV model is consistent, but GLS is not (Ha).

Thus, under the null, the two estimates should not differ systematically, and a test can be based on the difference. The other essential ingredient of the test is the covariance matrix of the difference vector $\widehat{\beta_{FE}} - \widehat{\beta_{RE}}$.

In poor words, the covariance of an efficient estimator with its difference from inefficient estimator is zero. This results implies:

$$Cov\left[\widehat{\beta_{FE}} - \widehat{\beta_{RE}}\right] = Var[\widehat{\beta_{RE}}]$$

[3] It means that is not correlated with ε_{it} present or past. If it does not hold you will use dynamic panel.

which yields:

$$Var[\widehat{\beta_{FE}} - \widehat{\beta_{RE}}] = Var[\widehat{\beta_{FE}}] - Var[\widehat{\beta_{RE}}].$$

The Hausman test is:

$$W = [\widehat{\beta_{FE}} - \widehat{\beta_{RE}}]'[Var[\widehat{\beta_{FE}}] - Var[\widehat{\beta_{RE}}]]^{-1}[\widehat{\beta_{FE}} - \widehat{\beta_{RE}}].$$

which is asymptotically distributed as a $\chi^2(k)$, where k is the number of degrees of freedom equals to number of parameters to be estimated. If W is greater than the preferred critical value, it means that there is a statistically significant difference between the two estimators. Note. Since only $\widehat{\beta_{FE}}$ is consistent, we have to conclude that $\widehat{\beta_{RE}}$ is inconsistent; otherwise orthogonality of covariance fails.

[Table 2 about here]

In order to measure the persistence of the results in long-run and short-run a lagged variable should be introduced in the previous model.

$$Yur_{it}=Yur_{it-1} + \alpha SWTR_{it} + \beta X_{it} + \varepsilon_{it}$$

3.3. Dynamical panel data analysis

Now we move on to various extensions for linear models, with focus on relaxation of the strong exogeneity assumption to permit consistent estimation of models with endogenous variables and/or lagged dependent variables as regressors.

The use of Instrument Variables (IV) is a standard method to handle endogenous regressors. Note that is much easier to find IV with panel data than with cross-section data, since exogenous regressors in other time periods can be used as instruments for endogenous regressors in the current time period.

Panel data provide an excess of moment conditions available for estimation, owing to an abundance of instruments, and panel model errors are usually *iid*. The natural framework is that of Panel Generalized Methods of Moment (GMM).

Since the number of instruments may exceed the number of endogeneous variables (over-identification rather than just identification), the natural question arises on which moments to use. The generalized method of moments estimation technique deals with this issue and provides a general framework for estimation of models with endogenous dependent variable. The method is general in a sense that it nests the ordinary least squares and the instrumental variables estimators.

Consider the linear panel model:

$$y_{it} = \beta X'_{it} + \varepsilon_{it}$$

Where the regressors X'_{it} may have both time-varying and time-invariant components and may incluse an intercept. Here there is no individual-specific effect α_i. X'_{it} is assumed to

include onlu current-period variables. Observations are assumed to be independent over *i* and a short panel with T fixed N--> ∞ is assumed.

Begin by collecting all T observations for the *i*th individual:

$$y_i = \beta X'_i + \varepsilon_i$$

We can apply directly to this model IV. Assume the existence of a T*r matrix for instrument Z_i, where r ≥ K is the number of instruments, that satisfy the *r* moment conditions:

$E(Z_{it}, \varepsilon_{it}) = 0$

The GMM estimator based on these moment conditions minimizes the associated quadratic form

$$Q_N(\beta) = [\sum_{i=1}^{N} Z_i' \varepsilon_i]' W_N [\sum_{i=1}^{N} Z_i' \varepsilon_i]$$

Where W_N denotes an r x r weighting matrix. Given $\varepsilon_i = y_i - \beta X'_i$, some algebra gives the Panel GMM estimator:

$$\widehat{\beta_{PGMM}} = [(\sum_{i=1}^{N} X_i' Z_i)' W_N (\sum_{i=1}^{N} Z_i' X_i)]^{-1} (\sum_{i=1}^{N} Z_i' X_i)' W_N (\sum_{i=1}^{N} Z_i' Y_i)$$

The essential condition for the existence of this estimator is, once again, :

$E(Z_{it}, \varepsilon_{it}) = 0$

There is a one-step and a two-step Panel GMM. The one-step GMM or two-stage least-square estimator uses weighting matrix $W_N = (\sum_{i=1}^{N} Z_i' Z_i)^{-1}$=$(Z'Z)^{-1}$, leading to:

$$\widehat{\beta_{2SLS}} = [X'Z(Z'Z)^{-1}Z'X]^{-1}X'Z(Z'Z)^{-1}Z'y$$

The motivation for this estimator is that it can be shown to be the optimal PGMM estimator based on $E(Z_{it}, \varepsilon_{it}) = 0$ if $\varepsilon_i | Z_i$ is iid [0, $\sigma^2 I_T$].

This estimation is called one-step GMM because given the data it can be directly computed using the equation above. It is called "SLS because it can be obtained in 2 stages by:

OLS of X_i *on* Z_i that gives back $\widehat{X'_i}$

OLS of y_i on $\widehat{X'_i}$.

The two-step GMM is based on the unconditional moment of $E(Z_{it}, \varepsilon_{it}) = 0$ using weighting matrix $W_N = \widehat{S^{-1}}$, where $\hat{S}$ is consistent S defined as:

S=$plim \frac{1}{N} \sum_{i=1}^{N} Z'_i \varepsilon_i \varepsilon'_i Z_i$

Using $\hat{S}$ you have the two-step GMM estimator :

$\widehat{\beta_{2SGMM}} = [X'Z\widehat{S^{-1}}Z'X]^{-1}X'Z\widehat{S^{-1}}Z'y.$

It is called two-step GMM since a first-step consistent estimator of β such as $\widehat{\beta_{2SLS}}$ is needed to form the residuals $\widehat{u_i}$ used to compute $\hat{S}$.

*The A*rellano-Bond Estimator is

$y_{it} = \gamma_1 y_{it-1} + \beta X'_{it} + \alpha_i + \varepsilon_{it}$ leads to the first-differences model:

$$y_{it} - y_{it-1} = \gamma(y_{it-1} - y_{it-2}) + \beta\left(X'_{it} - X'_{it-1}\right) + (\varepsilon_{it} - \varepsilon_{it-1})$$

We already said that the OLS estimator is inconsistent because y_{it-1} is correlated with ε_{it-1}, so the regressor $(y_{it} - y_{it-1})$ is correlated with $(\varepsilon_{it} - \varepsilon_{it-1})$.We said that in order to estimate the above model we need Istrument Variables. Anderson and Hsiao (1981) proposed as IV $y_{i,t-2}$ in order to estimate $(y_{it-1} - y_{it-2})$. This is a valid instrument since is not correlated with $(\varepsilon_{it} - \varepsilon_{it-1})$[4]. Moreover, $y_{i,t-2}$ is a good instrument because it is correlated with $(y_{it-1} - y_{it-2})$. This method requires availability of three periods of data for each individual. An alternative is tu use $\Delta y_{i,t-2}$ as an instrument for $\Delta y_{i,t-1}$, which will require four period data. Anderson & Hsiao present results suggesting that $\Delta y_{i,t-2}$ is the more efficient IV among the two in the case $\gamma > 0$.

More efficient estimation is possible using additional lags of the dependent variable as IV. As you can imagine the model then is overidentified, so estimation should be done by 2SLS or GMM [5]estimator.

The microeconomics literature refers to the resulting GMM estimator as the Arellano-Bond estimator. The estimator is:

$$\widehat{\beta_{AB}} == [(\sum_{i=1}^{N} \widetilde{X_i}' Z_i)' W_N (\sum_{i=1}^{N} Z_i' \widetilde{X_i}')]^{-1} (\sum_{i=1}^{N} \widetilde{X_i}' Z_i)' W_N (\sum_{i=1}^{N} Z_i' \widetilde{y_i}')$$

Lags of X_{it} or ΔX_{it}can additionally be used as instruments, and fore moderate or large T there may be a maximum lag of $y_{i,t}$that is used as an instrument, such as not more than $y_{i,t-4}$. The method is easily to replace to the AR(p) model, with $\gamma_1 y_{it-1}$ in the model $y_{it} = \gamma_1 y_{it-1} + \beta X'_{it} + \alpha_i + \varepsilon_{it}$ replaced by $\gamma_1 y_{it-1} + \cdots + \gamma_p y_{it-p}$ though more than three periods of data will be needed to permit consistent estimation.

4. Data and variables

The data bank includes 21 countries observed over a period of 43 years, from 1970 till 2013. The number of variables used was around 143. Hence, the panel had 924 observations. Unfortunately, not all variables covered the entire period for every country. For this reason, only

[4] Assuming that errors are serially uncorrelated.

[5] The more you are close to time *t* (present) the less are your IV. Let's say you are in the period 3, you have $y_{i,1}$. You are in the period 4, you have $y_{i,1}$ and $y_{i,2}$. You are in the period 5 and you have $y_{i,1}$, $y_{i,2}$ and $y_{i,3}$ and so on.

the variables that were not presenting missing observations during a fixed period of time (say by 2001 till 2011) have been selected.

After this procedure 20 countries observed over a period of 10 years compose the panel[6]. The number of variables used is around 97. Hence, the panel is composed by 231 observation. Table 3 includes the description of all the variables used in the econometric analysis and the relative source.

[Table 3 about here]

Table 4 reports the expected sign of the estimated variables. The expected beta of per capita GDP level and growth is negative. The impact of per capita GDP level should be probably attributed to the higher technological level, which typically implies more labor market dynamism and technological innovation. Moreover, with per capita GDP growing, firms hire more, especially young people. As reported, among others, in Jimeno and Rodriguez-Palenzuela (2003), the YUR is particularly fluctuating with the business cycle.

A positive beta is expected for Youth and Active Youth population because if the number of young people increases and the number of work places remains the same, then a bottleneck effect is expected. Meaning that there will not be enough work for all the young people gathering at the labor market. The same applies especially to active young people. A bottleneck effect was behind the so called baby boom of the post-World War II period, which was often recalled as an explanation of the YUR in the 1980s and 1990s (see, for instance, the contributions contained in Freeman and Wise, 1982; and in Blanchflower nd Freeman, 2000). Today, a bottleneck hypothesis is often associated to baby booms, but also to increasing migration, in addition, also in the public opinion.

Moreover, a negative beta is expected for secondary and tertiary education attainment, because education should give to young people the skills that should help them to deal with the world of work.

PLMPs are expected to have a positive coefficient, because if the Government pays the unemployed, their reservation wage increases reducing the availability to work for the unemployed. On the opposite side, ALMP are expected to have a negative coefficient, because those policies should help countries to reduce youth unemployment rates. However, on the other hand, the expenditure in ALMPs may be higher the higher the YUR, which would return a positive coefficient. This may be also the result for having missing observations on those two variables.

A positive beta of the EPI is expected because if a country presents a high level of employment protection it means that there are a lot of firing and hiring costs. Those lead labour

[6] Luxemburg is an outlier in all the estimates.

markets to be more rigid since employers think a lot before hiring some new workers in order to reduce the cost of labor, or even when workers are hired, high firing costs do not allow managers to dismiss workers. This leads to higher youth unemployment.

[Table 4 about here]

What follows is a complete descriptive analysis of the variables used in the Panel. Since the basic thesis is trying to empirically demonstrate that the dual system could be a good solution to youth unemployment if applied in all European Countries, in all the graph a distinction is used in order to let the reader better understand where the countries using different educational and welfare system are positioned.

4. Results

4.1. Descriptive analysis

The analysis starts by showing the youth unemployment rate during three different years: 2001 (pre-crisis), 2008 (during the crises) and 2011 (after the crisis exploded). Panel a) of Figure 3 shows the level of youth unemployment during the pre-crisis period. The highest YUR is in Poland and Slovakia, while the lowest YURs are where the Dual system (in red) is used and in the Anglo-Saxon System (in blue). Other countries with a high YUR are the Mediterranean countries (in green). During the crisis period, the YUR increased a lot in some countries. The the Mediterranean System (in green) are the worst performers, while the countries using the Dual System, once again, and the Anglo-Saxon countries that reacted well to the crises period. After the crisis year, in 2011, youth unemployment seems to be rocketing in Mediterranean countries reaching pick of about 46%. The countries that best performed are those belonging to the dual system, such as Austria, Germany and Netherlands, which showed a very low youth unemployment rate, at around 10%. Overall, it can be seen that among all the periods considered, the countries belonging to the Dual System are those with the lowest YUR, while Mediterranean and New EU Member have the worst.

[Figure 3 about here]

Let us now look at scatter plots of the YUR with the aforementioned independent variables to catch regularities and expected signs. Figure 4 confirms overall the expectation of a negative relationship between the YUR and the per capita GDP level. In other words, the most developed countries tend to have lower YUR. Notably, the regression lines are negative for all countries except for those countries belonging to the Mediterranean and Scandinavian welfare system, meaning that in the case of this group of countries, an increase in per capita GDP is correlated with an increase in YUR. The overall effect might depend on the role of the richest countries

within the EU, namely Germany and Austria. The Mediterranean countries and the NMSs exhibit the highest YUR, while, on contrast, Dual System countries show the lowest.

[Figure 4 about here]

Figure 5 focuses on per capita GDP growth. Almost all countries shows a relative positive per capita GDP growth over the pre-crisis period, and in this period the New Member States are showing the worst YUR while, as usual, the Dual system countries are showing the best YUR. From the crisis year (2008) some Dual System and Anglo-Saxon countries are showing negative per capita GDP growth. In 2009, per capita GDP has the lowest growth rate for almost all countries. The worst country that year is Estonia while the best is Poland, in terms of per capita GDP growth. In the period 2010-2011, Mediterranean countries are the worst performing, especially Spain and Greece. Overall, there is a slightly negative relationship between YUR and per capita GDP growth.

[Figure 5 about here]

Figure 6 focuses on the percentage of the working force aged 15-24 over the total labor force. An increase in the youth population is expected to correlate positively with an increase in the YUR, because of a "bottleneck effect": too many young people for the same number of jobs. The fitted lines tell us that a bottleneck effect is at place. That is observable for almost all welfare states except for the Anglo-Saxon and the Mediterranean Welfare System, because there the effect seems to be exactly the opposite.

[Figure 6 about here]

We also look at the active population (namely Employed population + Unemployed population) aged 15 and over that are really willing to find a job. It is expected a negative relationship if the market is flexible and if the market has not reached the NAIRU. Figure 7 as expected slightly positive relationship between YUR and active population, meaning of course that the larger the share of job seekers, the higher the YUR, which might be due to two factors. First, the number of jobs is always the same, and there is a "bottleneck" effect; second, if also the adults are actively looking for a job, there is more competition among generations which might reduce the chances for the youth segment of the population. Figure 7 seems to hint at a positive relationship.

[Figure 7 about here]

We also look at the percentage of people aged 25-34 years who attained upper secondary or tertiary education. In principle, a negative relationship is expected, because education should reduce youth unemployment. Figure 8 and 9, however, do not seem to confirm this in a clear way. For tertiary education attainment, an explanation could be that since the EDU3 take those young person who take a degree in typical age, it could be that a certain period of time has to be

waited before those graduated students will find a job. And it is theoretically correct. Most of young during studies do not actively look for a job. Once graduated, contrary, they start to look for a job actively and leads to increase the YUR at least in the first year. There is also another aspect to be take into account and is the "over education". Often, student choose a curricula in which the grat part of the other students are already attending. The results is that the jobs are always the same, but the number of people asking for that job are exponentially increasing. It leads to a lack of number of job places for all, creating a "bottleneck effet".

[Figures 8 and 9 about here]

In order to shed some light the employment gap has been computed as the difference between the employed aged 25 to 54 and the employed aged 15 to 24. This variable as been related with the percentage of people who attained tertiary education. Figure 10 shows the annual relationship between the employment gap and the people who attained the tertiary education. The countries in the 2001 are in the left part of the graph while moving toward 2011 countries are shifting to the right meaning that the number of people who attained tertiary education grew up. In almost all countries, the employment gap seems to increase meaning that the number of youth employed decrease or adult employed increase. Overall, it can be seen that the countries showing the lowest employment gap are those belonging to Anglo-Saxon countries and to the dual system as expected. Something has to be noticed, over all the period some dual system showed the worst employment gap; those countries are Slovenia form 2001 till 2003.

[Figure 10 about here]

Figure 11 regards the total expenditure in active labor market policies over per capita GDP[7]. They include different governmental programmes of training, counselling etc, which aim to increase the employability of the unemployed and therefore their likelihood to find work. Overall, they should obviously reduce the YUR. In fact, the figure confirms for the greatest part of the countries a negative relationship, at least until 2007, from when something seems to change. Overall, the dual system countries seems to be the countries who spent more on ALMP and those who benefited also more from this expenditure. The within-SWTR relationship switches in some cases to positive, which might generate problems in the estimates. this is the case of the contries with the highest unemployment rate, but problems of public finance, whereas the total expenditure in ALMP is low, but seems to increase with the YUR.

[Figure 11 about here]

[7] The definition is took from http://en.wikipedia.org/wiki/Active_labour_market_policies

The next variable examined is Passive Labor Market Policy (PLMP)[8], that consist of polices that provide income replacement as well as labour market integration measures available to unemployed or those threatened by unemployment. It is expected a positive relationship between YUR and PLMP because a person who is collecting income replacement by government is not willing to find actively a job, especially if passive income support represents a high share of prospective incomes, which might be the case for low skill young people. In fact, there is also another explanation for a positive sign: the higher is the YUR, the higher must be also the expenditure in PLMP, because the bigger will be the share of those in need. From Figure 12, it is not that clear what kind of relationship there is between YUR and PLMP.

[Figure 12 about here]

According to Caroleo and Pastore (2003), there is a positive ratio of PLMP to ALMP, which suggests that the overall expenditure in employment policy depends on the approach followed in the country and the importance attributed to them. Figure 13 confirms this hypothesis, suggesting that some degree of correlation could be in place between these two variables. An important evolution of employment policies could be to switch public resources from PLMP to ALMP.

[Figure 13 about here]

The OECD indicators for employment protection legislation measure the procedures and costs involved in dismissing individuals or groups of workers and the procedures involved in hiring workers on fixed-term or temporary work agency contracts. More particularly, the employment protection index for collective dismissal is the variable used in the estimates. Most countries impose additional delays, costs or notification procedures when an employer dismisses a large number of workers at one time. The indicator measuring these costs includes only additional costs which go beyond those applicable for individual dismissal. It does not reflect the overall strictness of regulation of collective dismissals, which is the sum of costs for individual dismissals and any additional cost of collective dismissals.[9]

These lead labor markets to be more rigid because firms will think a lot before hiring some new workers in order to reduce the cost of labor, or even when workers are hired, high firing costs do not allow managers to dismiss workers easily

If measured like this, a positive relations is expected with the YUR. The more employment protection increase, the more youth unemployment is expected to increase. Figure 14 largely

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[8] The definition is took from http://www.ilo.int/empelm/areas/labour-market-policies-and-institutions/lang--en/index.htm

[9] Decription taken from: http://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm.

confirms the expectation of a positive relationship between YUR and EPI, because of course the more EPI is high the more rigid the labour market is, which reduces the tendency of firms to hire and fire workers.

[Figure 14 about here]

4.2. Static panel data analysis

This section presents the results of multivariate econometric analysis. Table 5 presents FE estimates of equation [1]. Model 1 takes into account per capita GDP growth, youth population; Model 2 adds high secondary school attainment, tertiary education attainment, PLMP and EPI; in Model 3 EPI is dropped in order to catch the influence of YUPOP; in Model 4 PLMP is dropped and ALMP is inserted instead; in Model 5, since there the is a correlation between ALMP and D_NE because in those countries the expenditure on pro-active measures is big, the dummy variable is dropped in order to catch the influence of policies without D_NE.

Of course, the dummy variables are fixed effects and are hence dropped out in this type of estimates. As expected, per capita GDP growth reduces the YUR. In the short-run, an increase in youth population would be positively related with the YUR increasing the percentage of youth without work. Considering the high secondary school degree as the average level of education, an increase in the percentage of people with secondary degree will lead to a decrease of the YUR. As expected, in the short-run tertiary education leads to an increase in the YUR, maybe because it creates a bottleneck effect. With regard to the expenditure in PLMP, they lead in all models to an increase in the YUR, probably because of an increase in the reservation wage. The coefficient of the EPI is also as expected: increasing labor market rigidity causes an increase in the YUR, although the effect of the employment protection legislation is not always statistically significant. It is probably due also on the way the variable is built, with little variations over time which tend to cancel out. Overall, theoretical expectations on beta's are fulfilled for most variables.

[Table 5 about here]

Table 6 contains the results of RE estimations. The coefficients have similar signs. Per capita GDP growth is reducing the YUR, while the share of the youth population is increasing it. Also the signs of the other control variables are the same as before. The sign of the employment protection legislation turns positive and statistically significant, now. Interestingly, the RE model return the first estimates of the betas of the SWTRs. The baseline is represented by the eastern European countries, the group with the highest YUR. Also the South European countries are better off also in conditional terms in some, but not all the estimates. This suggests that the difference between the two groups of countries in terms of YUR are partly explained by the observed variables. The North European countries are doing better, although the coefficient

dramatically shrinks in relative terms when we also include the EPI, which might suggest that most part of the gap in YUR between these two groups of countries is explained by the EPI: if the EPI of Scandinavian countries were as high as that of the Eastern European countries, the gap in YUR would be even greater. Two groups of countries outperform all the others: the central European countries and the Anglo-Saxon countries. Their advantage in terms of YUR is neither explained by their lower degree of EPI nor by their higher per capita GDP level and growth.

[Table 6 about here]

We run a battery of Housman tests, one for each pair of models in the Tables 5 and 6, to decide whether to refer the FE or the RE model. Table 7 reports the results of the Housman test between Models 2, which are the most complete. For shortness' sake we omit the other tests. All of them, except for the test between Models 1, reject the H_0 of equality of coefficients, which suggests that we should focus on the FE model, which is the most consistent one.

[Table 7 about here]

A major shortcoming of the FE model is that it does not allows estimating the coefficient of our SWTRs. Therefore, we turn to the least square dummy variable (LSDV) estimates, which we report in Table 8, using the same specifications as before, but now with the estimated coefficients for our SWTRs. These are clearly our final (static) panel estimates. The coefficients of control variables are the same as before: statistically significant and negative for per capita GDP growth. Where statistically significant, the youth population tends to increase the YUR due to the aforementioned bottleneck effect. Secondary education attainment has again a negative beta, but is statistically significant only in two models. Tertiary education is still significant and with a positive beta. PLMP is now not statistically significant in any model. Comparing the LSDV coefficient for EPIC with the FE model coefficient, it appears that in the short-run (FE model) it tends to increase a little bit the YUR; but, in the long-run, as the LSDV estimation shows, beta is almost 1. As earlier, ALMP has a negative beta, while PLMP has no discernible effect on the YUR.

However, the most important feature of Table 8 is that, even in the case of LSDV estimates, the dummy relative to the countries using the dual educational system has a statistically significant, negative coefficient and is the one that tends to reduce the YUR the most. Again, though, the Anglo-Saxon countries have a coefficient which is very similar to that of the countries belonging to the dual educational system in all estimated models. This confirms the theoretical expectations according to which the liberalist and the Central European SWT models are the most efficient in coping with the youth experience gap, although using a very different strategy.

In fact, it should be noted that for a full comparison of the Central European and Liberalist model, it would be necessary to consider also the degree of fluctuations of the YUR in the two groups of countries, which is not fully addressed in our empirical analysis. In the former group of countries, the YUR is always very low, whereas in the liberalist countries it is widely fluctuating, which might importantly affect the social preference for the system adopted in the former group of countries, holding constant their performance in comparative terms.

The other three SWT regimes are very similar in conditional terms, with the Scandinavian one performing slightly better and the South-European SWTR being almost identical in terms of ability to reduce the YUR than the baseline of Eastern European countries. Interestingly, when the expenditure in PLMP is included in the estimates, the Scandinavian countries are performing much better than the South and East European countries, which might be taken to suggest that the bad performance of the Scandinavian countries is partly due to their large expenditure in PLMP which tend to increase the reservation wage of their youth unemployed and therefore reduce their job search intensity.

The same applies to some extent also to the South European countries. In the models 4 and 5, where also the EPI is included, the disadvantage of East European countries tends to disappear, suggesting that their labor market rigidities partly explains their bad performance with respect to the other groups of countries.

[Table 8 about here]

Now, in order to check for the hysteresis of YUR, dynamic panel estimates are presented. In order to measure the persistence of the results in long-run and short-run a lagged variable should be introduced in the previous model.

$$Yur_{it} = Yur_{it-1} + \alpha SWTR_{it} + \beta X_{it} + \varepsilon_{it}$$

Where Yur_{it} is the youth unemployment rate, $SWTR_{it}$ are the country dummy with value 1 if belonging to certain school-to-work transition regime and 0 otherwise, X_{it} is a set of explanatory variable already presented in Table 1**.** Since it is common to have exogenous variables, system GMM is used in order to check for it and to confirm what has been already found out with LSDV estimation (Table 9).

[Table 9 about here]

Taking, as usual, as a baseline the SWT regime of the new member states, the first step of system GMM tells us that compared to those countries all the others are performing better in reducing the youth unemployment rate, but the one that has the highest beta in absolute value is the dummy for countries belonging to dual education system, namely Central European countries. Now, looking at the hysteresis of the YUR it can be seen that countries that have a

high YUR today is also depending on the YUR of the last year. While, contrary, the lag 2 of the YUR contribute to reduce the YUR of today.

The variable DL_GDP confirm the expectation even if a strong thing happens when looking at the lag 1 of this variable, in fact is found to increase youth unemployment rate an high level of growth of per capita GDP for the past year.

Tertiary education attainment has the beta expected in the present, but it is find out to have a negative beta leading to a reduction of YUR, it has a clear explanation: it seems quite obvious that in the long-run all the person with the tertiary degree will find some jobs, tending, this way, to reduce the YUR the year after. On contrary, in the short-run people with tertiary degree tend to increase YUR because they are not able to find a job once attained the degree.

Strange negative beta has EPIC in the second lag, being the first lag not significant. The second lag of EPIC is coherent with theory.

ALMP are not significant, but the beta sign was coherent with theory.

PLMP as expected has a positive beta in the short-run, and it is clear that it depends on the fact that young could be attracted from receiving a sort of salary from the government being unemployed. In the long-run, beta for PLMP is negative and statistically significant. According to the theory, government gives to youth unemployed a salary for a little period while they are still seeking actively a job. After a certain period it is clear that the youth has to seek a job, because government grant is not forever, and soon or later young knows that government grant will finish then they start actively to look for a job.

Table 10 presents the GMM estimation with the two-step: In the two-step GMM dummy variable are not inserted, because differencing the estimation they would be dropped out as well. Results of the First-step are largely confirmed, except with EPIC that here shows a negative beta, that perhaps is not significant.

[Table 10 about here]

Concluding remarks

Previous authoritative studies (Nickell, 1997; Nickell, Nunziata and Ochel, 2005; Bassanini, Nunziata and Venn, 2009) have studied the determinants of the aggregate unemployment rate across countries and over time. To our knowledge, this essay presents the first available econometric estimates of the impact of different school-to-work transition regimes on the absolute youth disadvantage at the labor market. Much research has been conducted at a theoretical level on the possible role of school-to-work transition regimes on youth labor market outcomes. Nonetheless, up to now, no empirical analysis has been deployed

to empirically assess the role of different labor market and SWT institutions on youth labor market outcomes. This is the first research attempting this analysis in the context of (static and dynamic) panel data analysis.

We study both the unconditional differences and the differences conditional on a number of macroeconomic and institutional factors, such as per capita GDP level and growth, youth population, secondary and tertiary education attainment, expenditure in PLMP and ALMP, degree of employment protection legislation. After presenting the results of LSDV estimate, we also present the results of a system GMM model to assess the relative impact of different school-to-work regimes, using data from the OECD data base. Most of the signs of the control variables are as expected, with per capita GDP level and growth reducing the YUR, the youth population generating bottleneck effects at the labor market, the expenditure in ALMP reducing the YUR and the degree of EPL increasing the YUR. PLMP and education attainment are not statistically significant or with the wrong sign, probably because of the unsatisfactory way these variables are defined.

We find evidence that the Continental European and the Anglo-Saxon SWT regime perform similarly in terms of YUR and much better than the other SWTRs also after controlling for labor market and educational institutions. This is suggestive of the fact that there is a specificity of these SWTRs, which is able to explain the lower than average youth absolute (and relative) disadvantage these countries experience. This specificity is not caught by any of the aforementioned variables.

Based on the theoretical framework laid down in the first sections, such specificity is to be found, in the case of Central European countries, in the dual education principle, according to which school based general education and work based vocational training are provided together rather than one after the other, as it is the case of the sequential system. More than the sequential system, the dual educational system, typical of Germany and other Central European countries, are able to help young people fill in their youth experience gap, through vocational on-the-job training. Nonetheless, it is remarkable that the countries belonging to the liberalist school-to-work transition regime are able to reach very similar results with a different solution. Their performance stands out also after controlling for the degree of employment protection legislation. Although accepting the sequential education system, liberalist countries couple a high quality, fast and efficient educational system with a very flexible labor market to allow young people filling their youth experience gap.

For a full comparison of the Central European and Liberalist model, it would be necessary to consider also the degree of fluctuations of the YUR in the two groups of countries, which is not fully addressed in our empirical analysis. In the former group of countries, the YUR is

always very low, whereas in the liberalist countries it is very flexible, which might importantly affect the social preference for the system adopted in the former group of countries.

The assumption of this study is that country dummies are catching the impact of SWTRs, once controlling for all the other confounding factors. Nonetheless, the findings of this study sound as a warning for such international organizations as the OECD, the ILO, the IMF and the World Bank, about the importance of collecting systematic statistical information on the main features of a SWTR to allow in future research overcoming our dummy variable approach and catching the importance of specific components of any SWTR, such as the existence of the duality principle, the degree of integration between educational institutions and labor market, the expenditure in entry and exit guidance, such as job placement activities.

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Appendix of Tables and Figures

Table 1. Variables definition

Model	Variable	Description	Unit of Measurement
Y	l_yur1524	Youth unemployment rate (15-24)	Percentage, log
X	dl_gdp	Growth of per capita GDP	US$ current prices, difference of log
	l_gdp	Per capita GDP	US$ current price, log
	l_yupop	Youth population (ylf/tlf)	Thousand of persons, log
	l_edu2	Secondary education	Percentage, log
	l_edu3	Tertiary education	Percentage, log
	l_epi	Employment protection index	Index of costs, logs
	l_almp	Active labour market policies	Public expenditure as a percentage of GDP, log
	l_plmp	Passive labour market policies	Public expenditure as a percentage of GDP, log
D	D_NE	North-European System Dummy	1 if Estonia and Sweden; 0 otherwise, binary
	D_CE	Central European (or Dual-Educational System) dummy	1 if Belgium, Germany, Austria, Netherlands, Denmark, France, Slovenia; 0 otherwise, binary
	D_AS	Anglo-Saxon system dummy	1 if United Kingdome and Ireland; 0 otherwise, binary
	D_SE	South European System dummy or PIGS dummy	1 if Greece, Italy, Portugal, Spain; 0 otherwise, binary
	D_NMS	New EU Member State System Dummy	1 if Poland, Slovakia, Hungary, Estonia and Czech Republic; 0 otherwise, binary

Source: own elaboration.

Table 2. A comparison of the FE and RE model

	H_0[10] True	H_1 True
$\widehat{\beta_{FE}}$	**Consistent**	**Consistent**
$\widehat{\beta_{RE}}$	**Consistent** **More Efficient**	**Inconsistent**

Table 3. Variables source

Variable	Unit	Name	SOURCE
EPI_C	Indices of costs	Employment Protection Index_Collective	Labour>Employment Protection> Strictness of employment protection – collective dismissals (additional restrictions)
EPI_I	Indices of costs	Employment Protection Index_Individuals	Labour>Employment Protection>Strictness of employment protection – individual dismissals (regular contracts)
LTIR		Long Term Interest rate	General Statistics > key short-term Economic indicator > Long Term Interest Rate
AI		Annual Inflation	Prices and Purchasing power>prices and prices indices > consumer price (MEI)>consumer prices-Annual inflation
RIR	index (where the year 2005 is the base year)	Real Interest Rate	Finance>Monthly financial statistics>monthly monetary and financial statistics(MEI)> interest rates

[10] Remember that the null hypothesis is that RE Model is the correct one (p-value ha sto be smaller than 0.05)

GDP	US $, current prices, current PPPs, millions	real GDP (98-2012)	National Account> Annual national account>Main aggregate> gdp> Gross domestic product (GDP) MetaData : GDP, US $, current prices, current PPPs, millions
EMPL	Thousands of persons	Empoyed (98-2012)	Labour>LFS>Short-Term labour market statistics>Employed population
YUR1519	percentages.	Youth Unemployment 15-19	Labour>LFS>LFS by sex and age-indicator>unemployment rate
YUR2024	percentages.	Youth Unemployment 20-24	Labour>LFS>LFS by sex and age-indicator>unemployment rate
YUR1524	percentages.	Youth Unemployment 15-24	Labour>LFS>LFS by sex and age-indicator>unemployment rate
UR1564	percentages.	Unemployment rate 15-64	Labour>LFS>LFS by sex and age-indicator>unemployment rate
ALMP	public expenditure as percentage of GDP	Active labour market policies	Labour>LAbour Market programmes>public expenditure as percentage of GDP> Active
PLMP	public expenditure as percentage of GDP	Passive labor market policies	Labour>LAbour Market programmes>public expenditure as percentage of GDP> Passive
UR2564	percentages	unemployment rate 25-64	Labour>LFS>LFS by sex and age-indicator>unemployment rate
RD=(YUR1524/UR2564)		Relative Deasdvantag	Computated
APOP	Thousands of persons	Active Population aged 15 and over	Labour>LFS>Short-term statistics>short term labour market statistics>Active population
YUPOP=(lfs1524/tlf)	Thousand of persons	Youth population	Computed
EDU3	percantage	Tertiary education	Education & training> Education at Glance> Appendix A>Atteined tertiary education degree, 25-34 years old(%)
EDU2	percantage	Secondary education	Education & training> Education at Glance> Appendix A>attained below upper secondary education, 25-34 years old(%)

Table 4. The expected sign of estimated coefficients

Variable	Expectation on β
Employment Protection Index	>0 (positive)
Per capita GDP	<0 (negative)
Per capita GDP growth	<0 (negative)
PLMP	>0 (positive)
ALMP	<0 (negative)
Secondary education	<0 (negative)
Tertiary Education	<0 (negative)
Youth population	>0 (positive)
Active Youth Population	>0 (positive)

Table 5. FE estimates

Variable	modFE1	modFE2	modFE3	modFE4	modFE5	modFE6
dl_gdp	-0.337***	-0.074	-0.083	-0.312**	-0.312**	-0.318**
l_yupop	-1.197	31.182***	30.614***	14.507**	14.507**	14.579**
D_SE	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	
D_AS	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	
D_CE	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	
D_NE	(omitted)	(omitted)	(omitted)	(omitted)		
l_edu2		-0.330***	-0.342***	-0.314**	-0.314**	-0.298**
l_edu3		0.335***	0.354***	0.353**	0.353**	0.325**
l_plmp		0.528***	0.502***			
l_epic		-0.299*		0.324	0.324	
l_almp				0.242***	0.242***	0.269***
_cons	3.334	-10.740***	-10.865***	-4.171	-4.171	-3.774
N	229	223	223	203	203	203
ll	-4.592	81.969	80.308	17.234	17.234	16.034
aic	15.184	-149.937	-148.615	-20.468	-20.468	-20.068

legend: * p<.1; ** p<.05; *** p<.01

Source: own elaboration.

Table 6. RE estimates

Variable	modRE1	modRE2	modRE3	modRE4	modRE5	modRE6
dl_gdp	-0.329***	-0.227**	-0.208**	-0.331**	-0.329**	-0.310**
l_yupop	0.626	1.838	3.736**	1.040	1.247	2.156
D_SE	0.062	-0.402**	-0.464*	-0.309	-0.197	
D_AS	-0.464*	-0.881***	-0.928***	-0.908***	-0.795***	
D_CE	-0.553***	-1.011***	-1.005***	-0.879***	-0.765***	
D_NE	-0.115	-0.734***	-0.777**	-0.370		
l_edu2		-0.232***	-0.250***	-0.162*	-0.137	-0.267**
l_edu3		0.203**	0.201**	0.353***	0.354***	0.186
l_plmp		0.341***	0.372***			
l_epic		0.075		0.501***	0.587***	
l_almp				0.085	0.029	0.107
_cons	2.782***	2.547***	1.879**	1.584*	1.182	1.993*
N	229	223	223	203	203	203
ll						
aic	.	.	.	.	.	.

legend: * p<.1; ** p<.05; *** p<.01

Source: own elaboration.

Table 7. Housman test

```
. hausman modRE2 modFE2

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     modRE2       modFE2       Difference          S.E.
-------------+----------------------------------------------------------------
      dl_gdp |  -.2266433    -.0743548       -.1522885        .0503979
     l_yupop |      1.838     31.18161       -29.34361               .
      l_edu2 |  -.2320371    -.3295064        .0974694               .
      l_edu3 |   .2032094     .3346536       -.1314442        .0136772
      l_plmp |   .3410426     .5282158       -.1871732        .0089323
      l_epic |   .0750548    -.2988838        .3739386               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       76.38
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

Source: own elaboration.

Table 8. LSDV estimates

Variable	LSDV1	LSDV2	LSDV3	LSDV4	LSDV5	LSDV6
dl_gdp	-0.382***	-0.390***	-0.384***	-0.295**	-0.288**	-0.257***
l_yupop	0.909*	0.845	0.991*	1.900**	1.609**	2.769***
D_SE	0.057	-0.107*	-0.058	-0.079	-0.151	
D_AS	-0.466***	-0.737***	-0.712***	-0.666***	-0.752***	
D_CE	-0.551***	-0.835***	-0.701***	-0.692***	-0.777***	
D_NE	-0.108*	-0.020	-0.351***	0.215*		
l_edu2		-0.003	-0.071*	0.022	0.001	-0.176***
l_edu3		0.298***	0.248***	0.378***	0.399***	0.049
l_plmp		-0.028	0.052			
l_epic		0.821***		0.919***	0.840***	
l_almp				-0.208**	-0.145**	-0.223**
_cons	2.657***	0.909*	2.116***	-0.208	0.106	1.771**
N	229	223	223	203	203	203
ll	-73.846	-31.306	-62.637	-22.076	-23.926	-94.750
aic	159.693	82.613	143.275	64.152	65.851	199.500

legend: * p<.1; ** p<.05; *** p<.01

Note: the number of observations reduces when we consider ALMP, because some observations are missing for this variable.
Source: own elaboration.

Table 9. System GMM, first step

Dynamic panel-data estimation, one-step system GMM

Group variable: country		Number of obs =	172
Time variable : years		Number of groups =	20
Number of instruments = 110		Obs per group: min =	6
Wald chi2(17) =	7255.93	avg =	8.60
Prob > chi2 =	0.000	max =	9

l_yur1524	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
l1l_yur1524	.9805244	.0888893	11.03	0.000	.8063046	1.154744
l2l_yur1524	-.260141	.0464358	-5.60	0.000	-.3511534	-.1691286
l_gdp	-2.0191	.3518492	-5.74	0.000	-2.708711	-1.329488
l1l_gdp	2.068842	.3363933	6.15	0.000	1.409523	2.72816
l_edu3	.4130471	.1802838	2.29	0.022	.0596974	.7663968
l1l_edu3	-.3746029	.1594076	-2.35	0.019	-.687036	-.0621698
l_edu2	-.1012809	.0559249	-1.81	0.070	-.2108918	.0083299
l_epic	.1274522	.0989734	1.29	0.198	-.066532	.3214365
l1l_epic	-.2800349	.072781	-3.85	0.000	-.4226831	-.1373867
l2l_epic	.2316492	.1300058	1.78	0.075	-.0231575	.486456
l_almp	-.0082981	.019405	-0.43	0.669	-.0463312	.0297351
l_plmp	.1742353	.0422184	4.13	0.000	.0914887	.256982
l1l_plmp	-.1044211	.0489868	-2.13	0.033	-.2004334	-.0084089
D_SE	-.1746285	.0843515	-2.07	0.038	-.3399544	-.0093027
D_AS	-.2335233	.1093813	-2.13	0.033	-.4479068	-.0191399
D_CE	-.3285042	.097429	-3.37	0.001	-.5194617	-.1375468
D_NE	-.1217346	.133105	-0.91	0.360	-.3826156	.1391463
_cons	.5576382	.4425661	1.26	0.208	-.3097753	1.425052

Source: own elaboration.

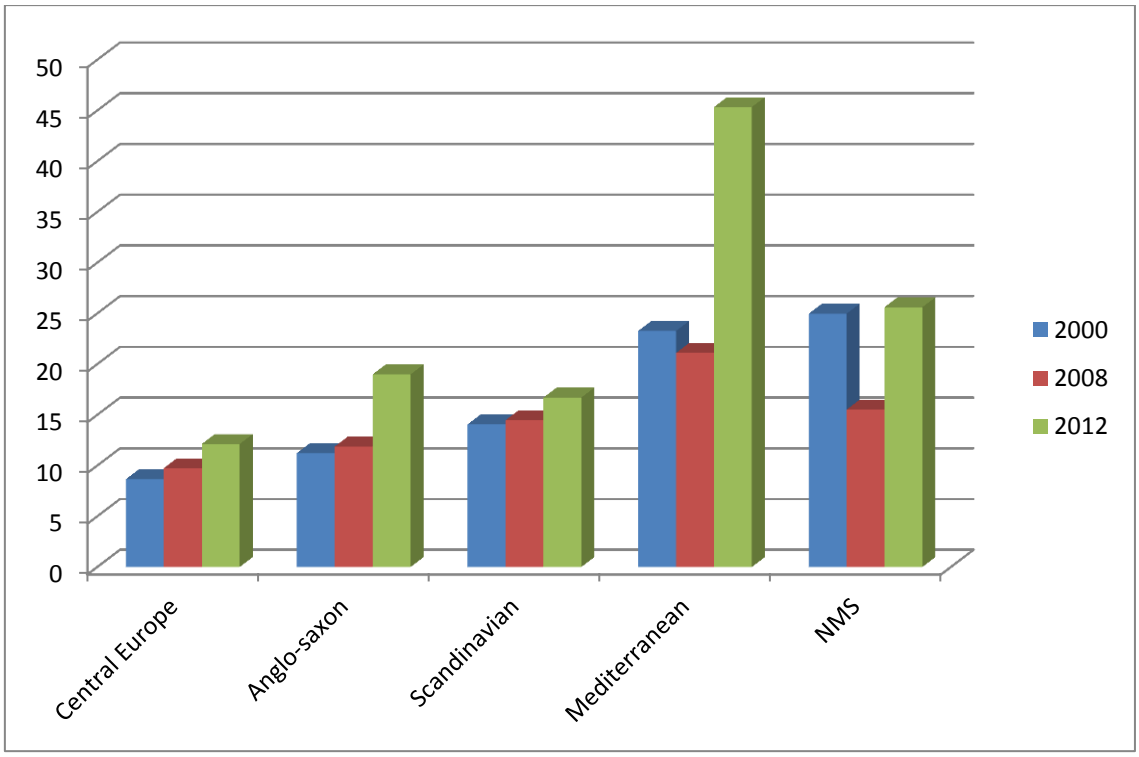
Table 10. System GMM, two-step estimetes

Dynamic panel-data estimation, two-step system GMM

Group variable: country		Number of obs =	209
Time variable : years		Number of groups =	21
Number of instruments = 71		Obs per group: min =	9
Wald chi2(7) =	208.99	avg =	9.95
Prob > chi2 =	0.000	max =	10

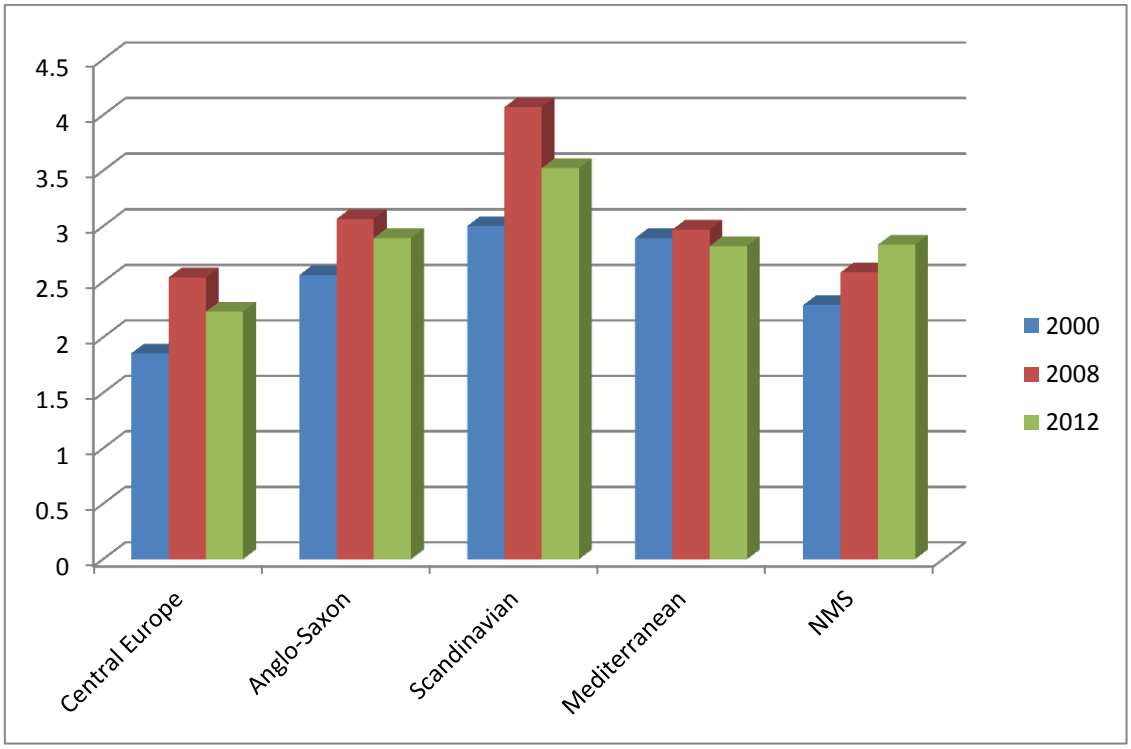
l_yur1524	Coef.	Corrected Std. Err.	z	P>|z|	[95% Conf.	Interval]
l1l_yur1524	.9541526	.2087562	4.57	0.000	.5449979	1.363307
l_gdp	-3.798235	.6335759	-5.99	0.000	-5.040021	-2.556449
l1l_gdp	3.230529	.5126956	6.30	0.000	2.225664	4.235394
l_edu3	.739395	.4764621	1.55	0.121	-.1944536	1.673244
l1l_edu3	-.6563392	.5807569	-1.13	0.258	-1.794602	.4819234
l_epic	-.0991399	.8303027	-0.12	0.905	-1.726503	1.528223
l1l_epic	-.4699164	.8141769	-0.58	0.564	-2.065674	1.125841
_cons	6.363168	4.710719	1.35	0.177	-2.869671	15.59601

Figure 1. Youth unemployment by school-to-work transition regime



Source: our elaboration on OECD data.

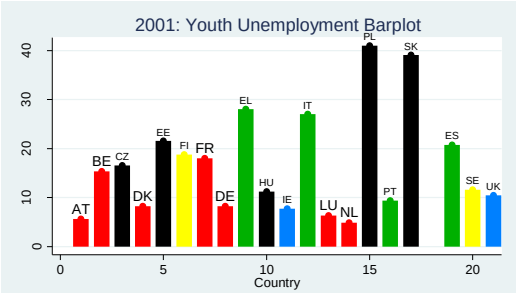
Figure 2. Relative disadvantage by school-to-work transition regime



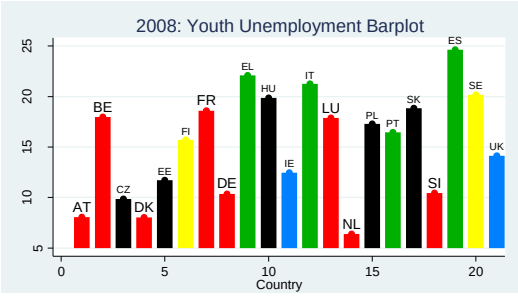
Source: our elaboration on OECD data.

Figure 3. The YUR in 2001, 2008 and 2011

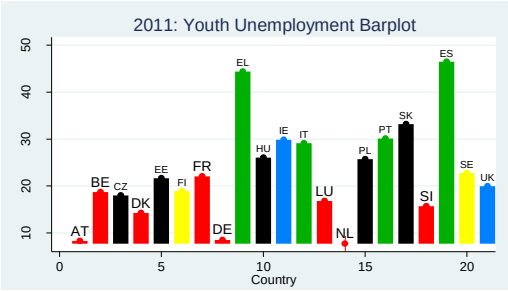
Panel (a)



Panel (b)

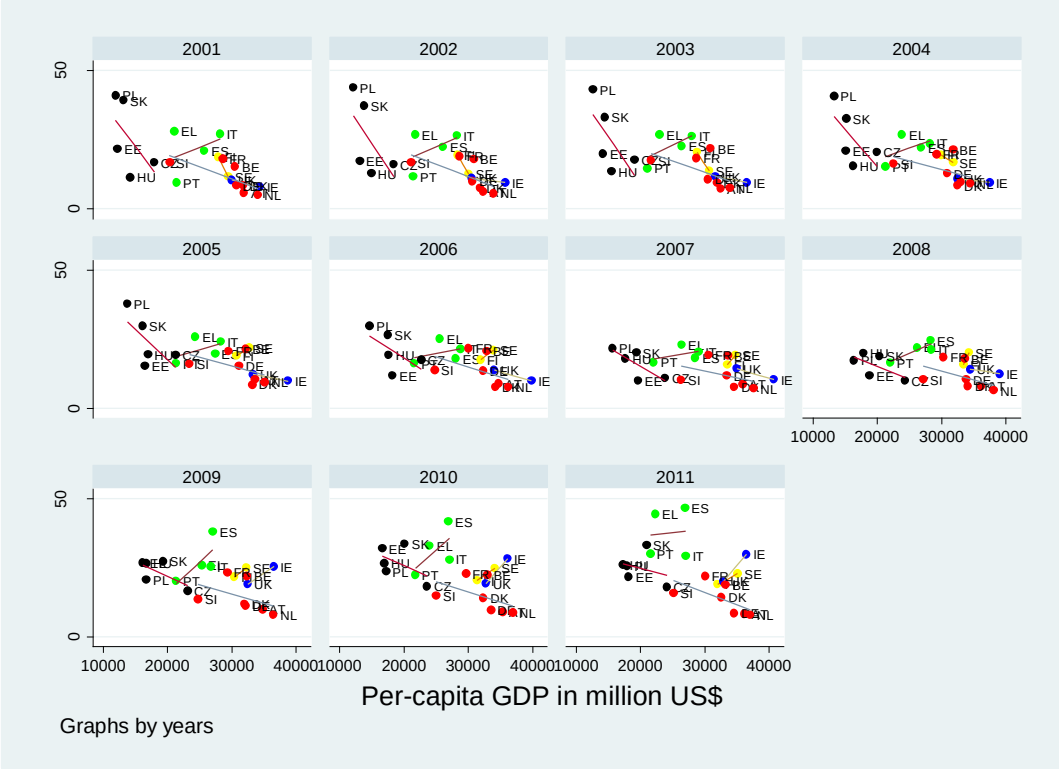


Panel (c)



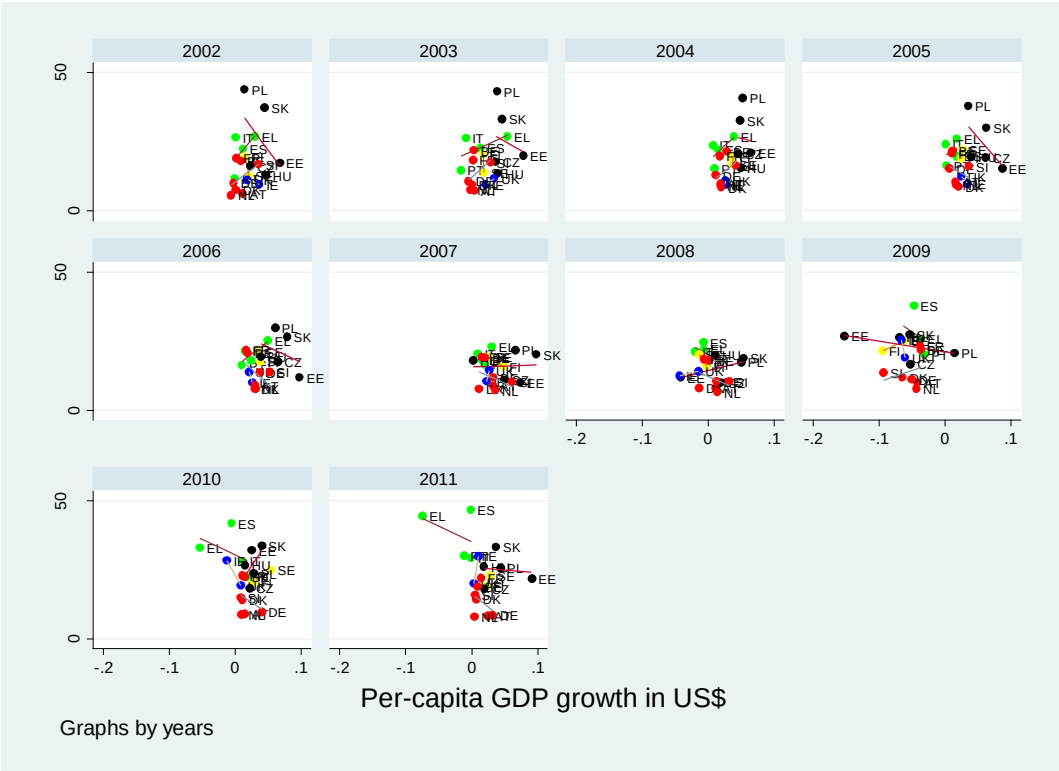
Source: own elaboration on OECD data.

Figure 4. YUR and per capita GDP level across countries (2001-'11)



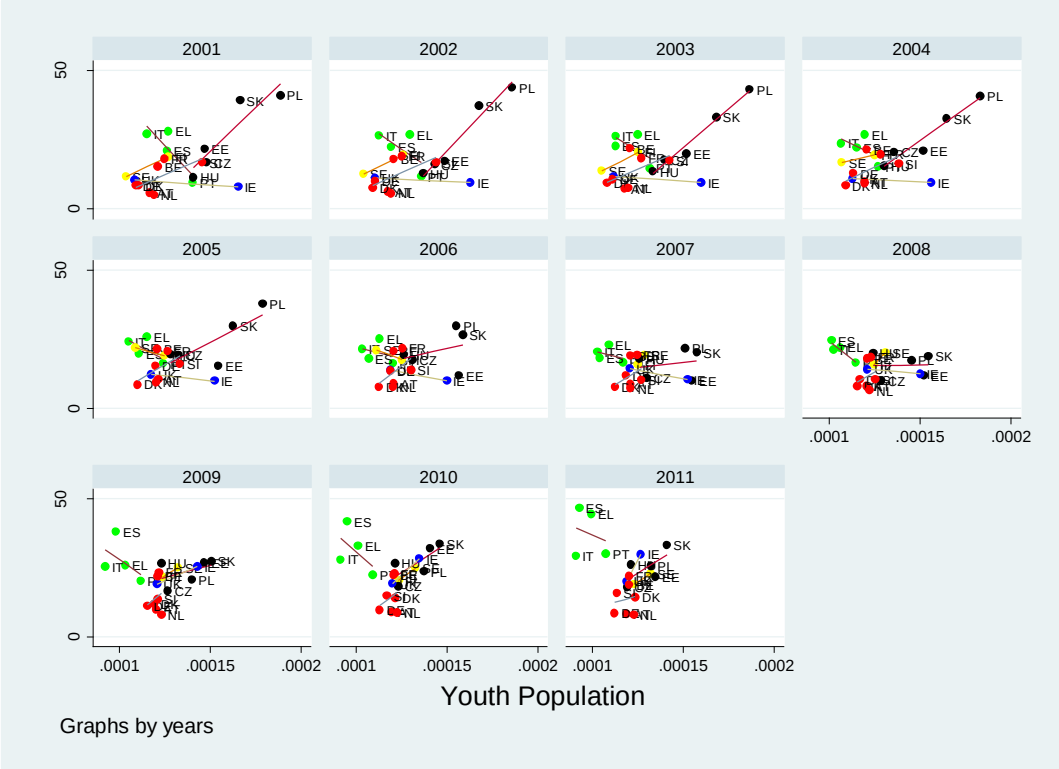
Note: GDP, per head, US$, current price, current PPPs.
Source: own elaboration.

Figure 5. YUR **and per capita GDP growth across countries (2001-'11)**



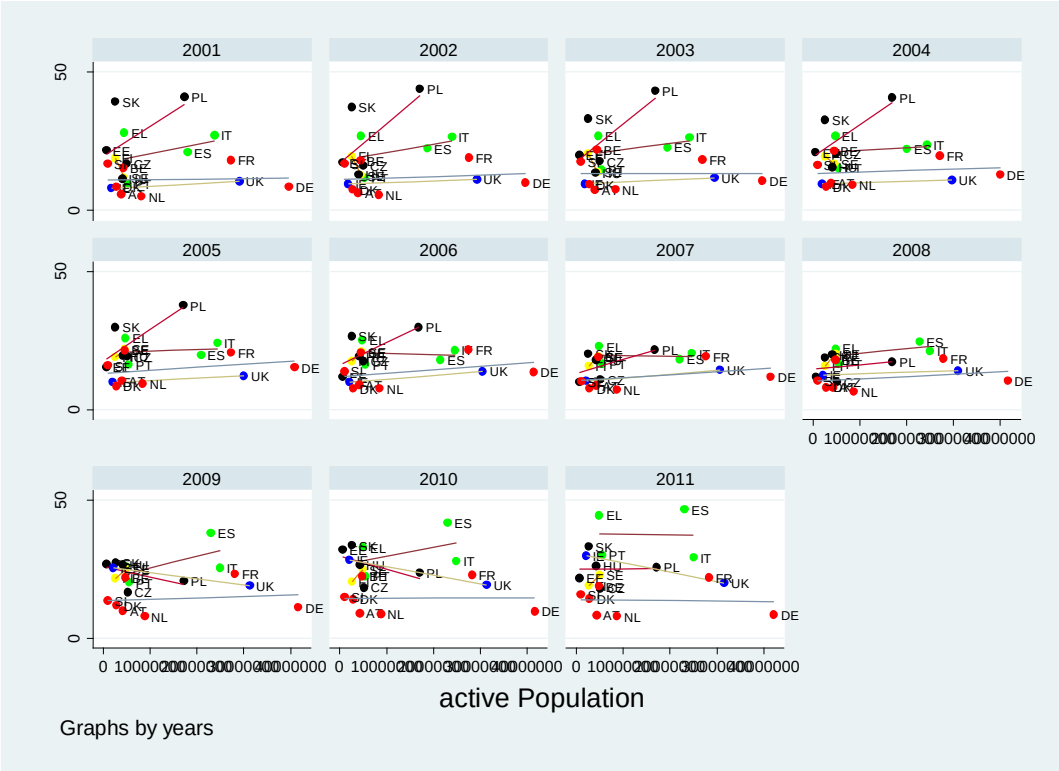
Note: GDP, per head, US$, current price, current PPPs.
Source: own elaboration.

Figure 6. YUR and youth population across countries (2001-'11)



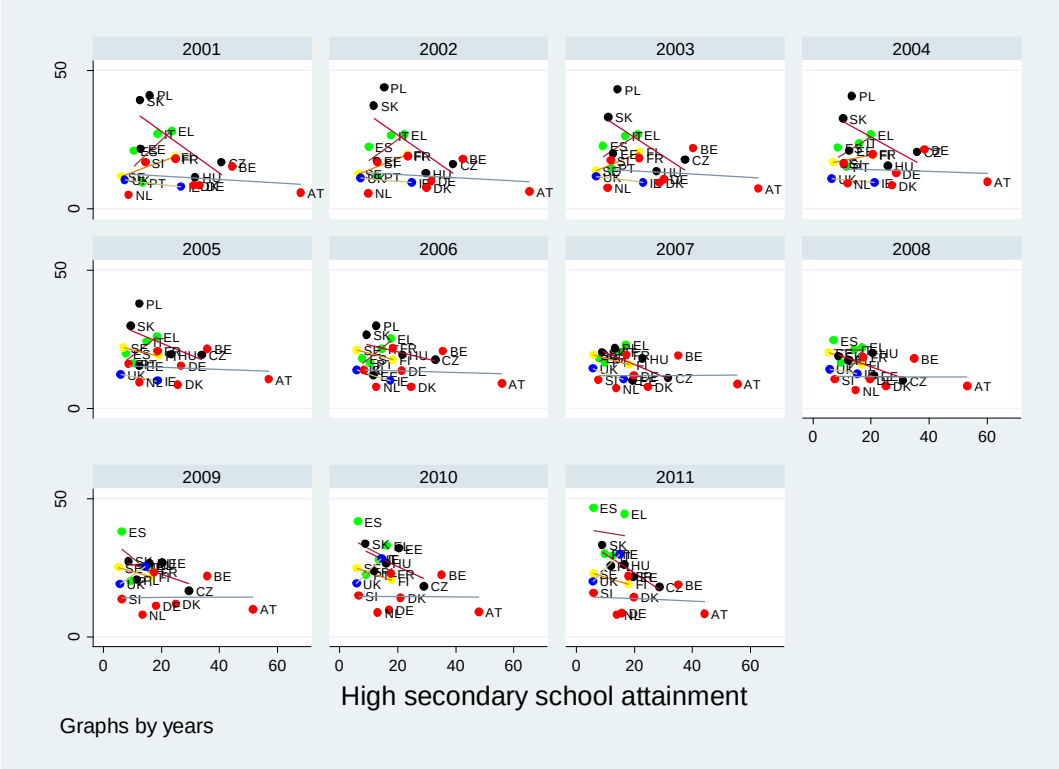
Source: own elaboration.

Figure 7. YUR and active population across countries (2001-'11)



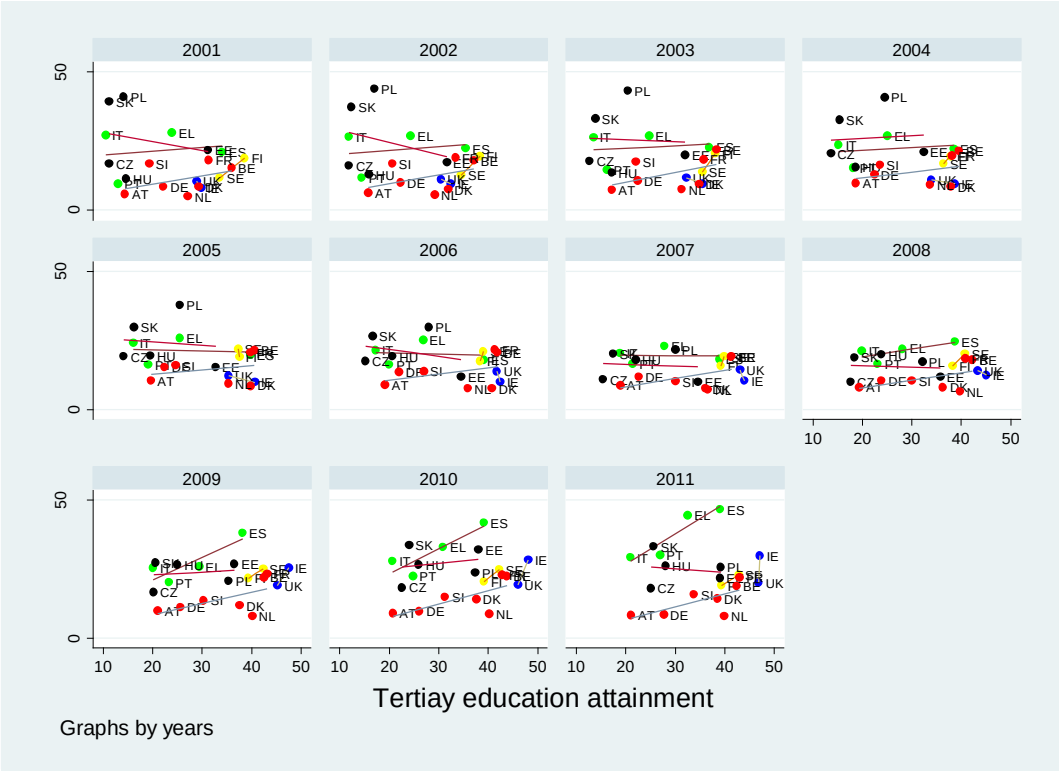
Source: own elaboration.

Figure 8. YUR and secondary education attainment across countries (2001-'11)



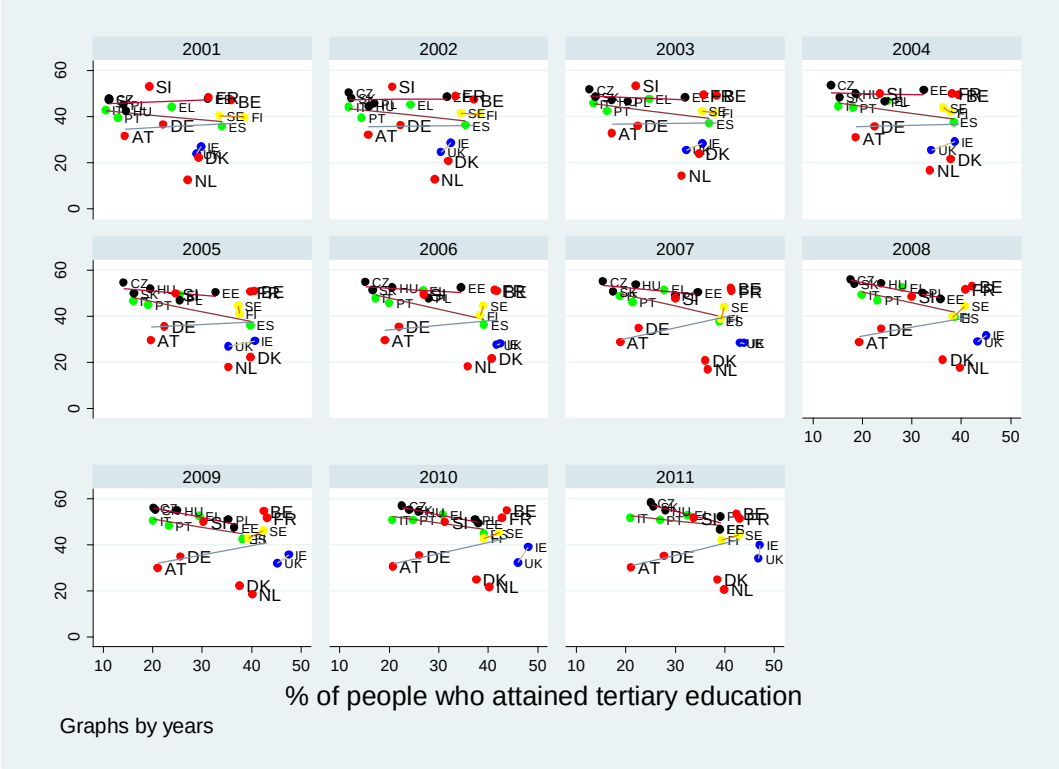
Source: own elaboration.

Figure 9. YUR and tertiary education attainment across countries (2001-'11)



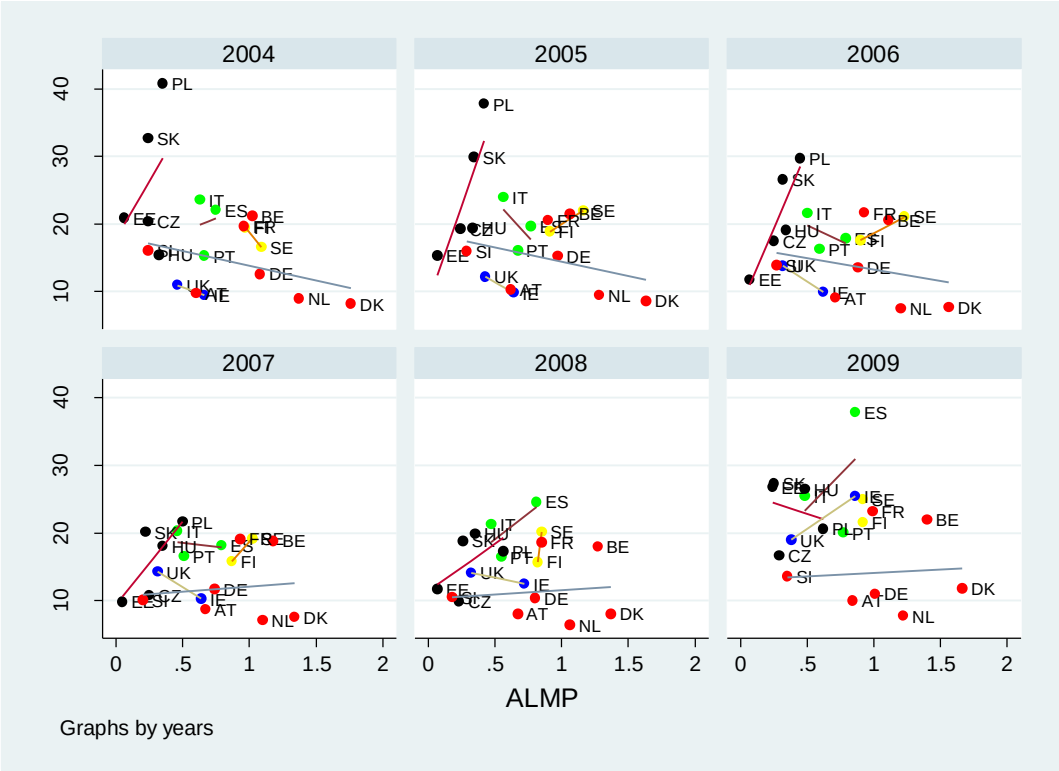
Source: own elaboration.

Figure 10. Employment gap and tertiary education attainment across countries (2001-'11)



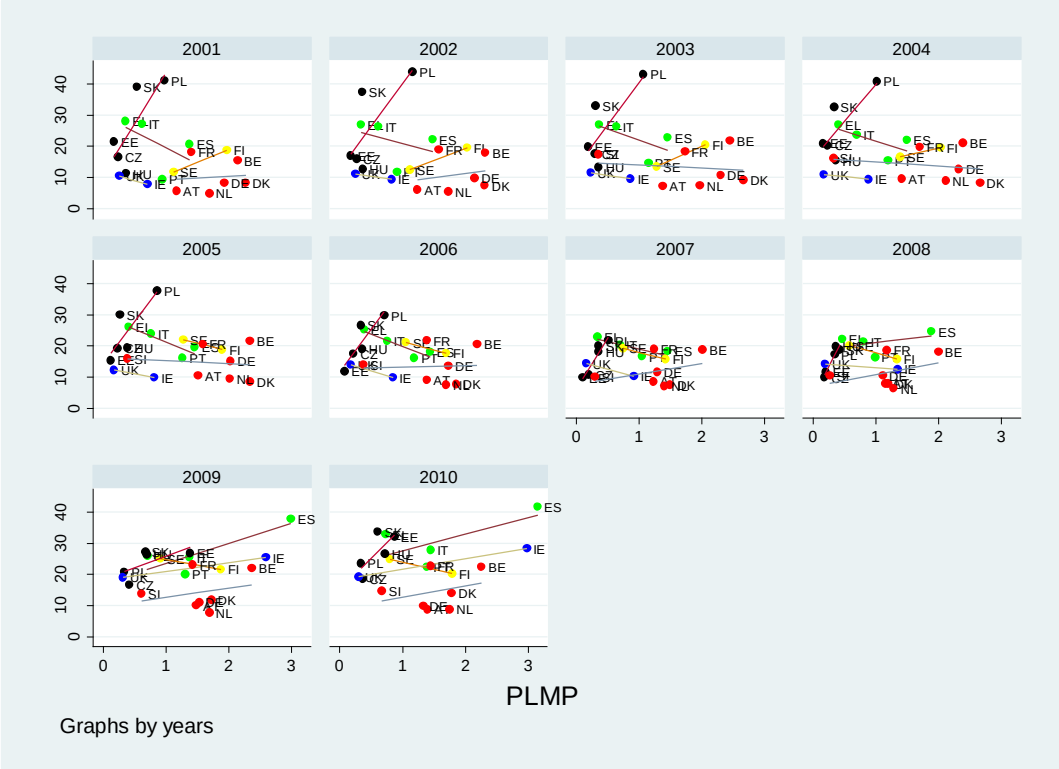
Source: own elaboration.

Figure 11. YUR and total expenditure in ALMP across countries (2001-'11)



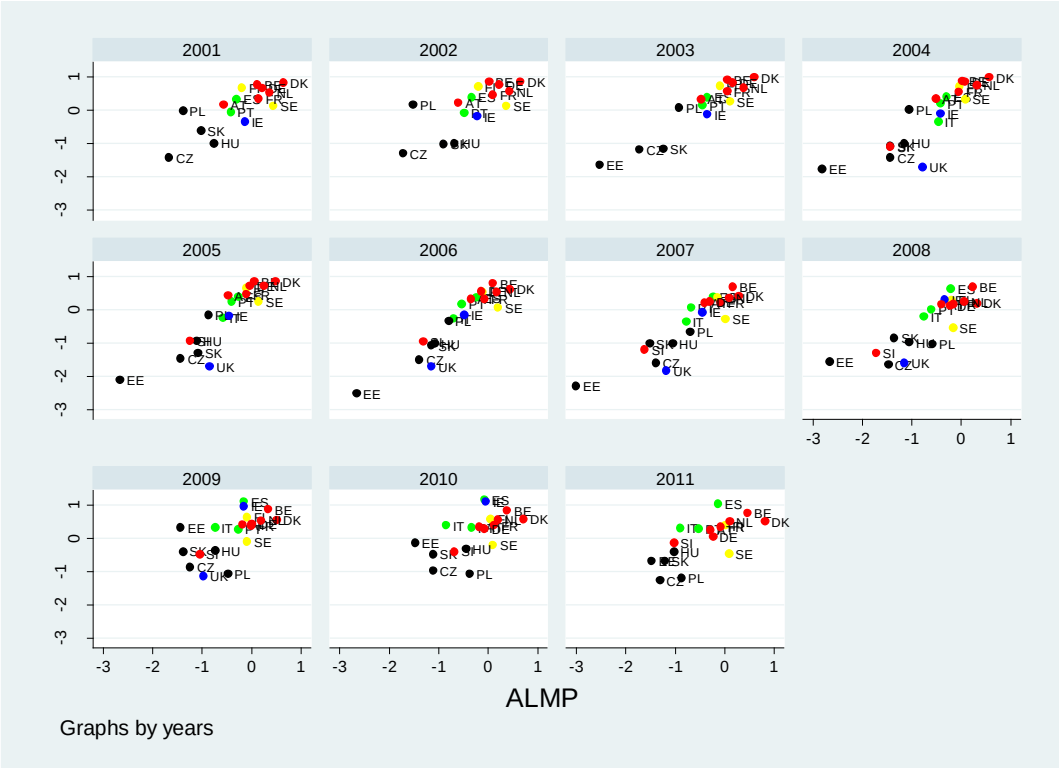
Source: own elaboration.

Figure 12. YUR and total expenditure in PLMP across countries (2001-'11)



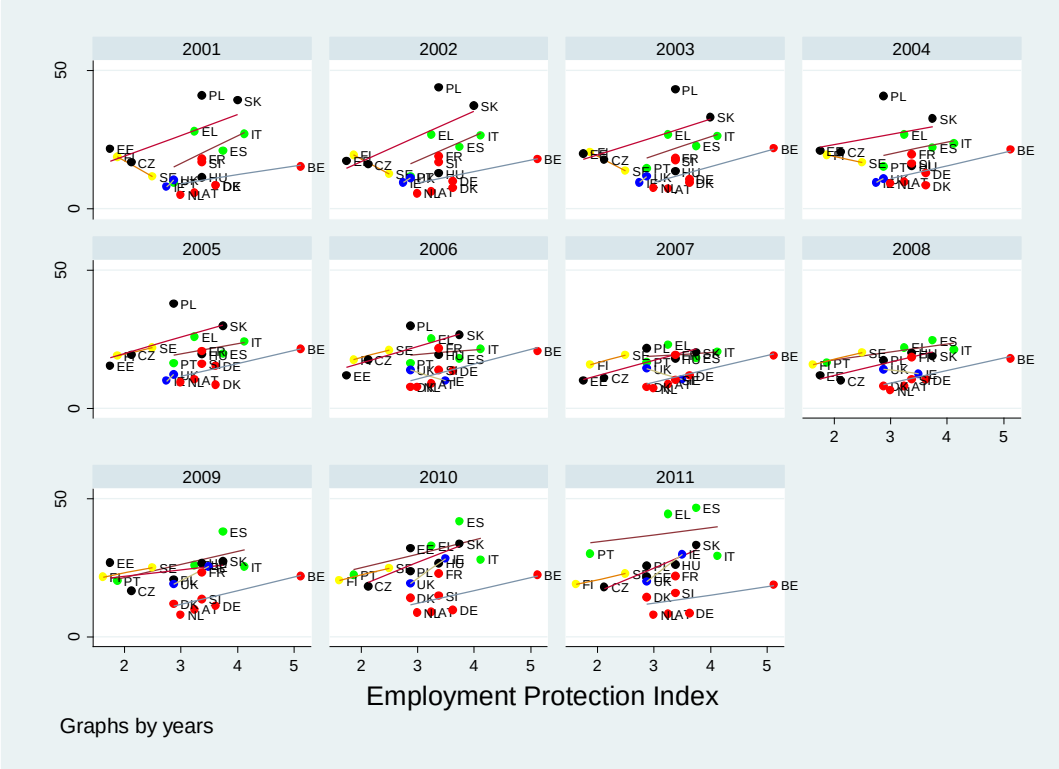
Source: own elaboration.

Figure 13. Ratio of public expenditure in passive and pro-active measures (2001-'11)



Source: own elaboration.

Figure 14. YUR and the OECD EPI across countries (2001-'11)



Source: own elaboration.