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Investigating Social Protection Convergence in the EU-15: A Panel Data Analysis

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Abstract:

The scientific investigation goal of this paper is to analyze the convergence of social protection indexes within the EU-15 member states. More specifically, we employ a panel data analysis, testing certain hypotheses of welfare convergence upon the 15 EU Member States, for the years 1990 to 2009, by considering three specific factors. GDP growth rate is used first as a proxy for the financial capacity of the system, while unemployment provides, next, a broader picture of the demand for social security benefits. Finally, the dependency ratio is used as a proxy of the countries' socio-demographic characteristics. Moreover, certain other exogenous factors reflecting economic integration are considered also. Panel data estimations confirm the existence of conditional β-convergence of social expenditure in EU-15 countries, with unemployment, dependency ratio and GDP growth having a significant impact upon the growth of social protection expenditure. With respect to specific external factors, the existing evidence is less clear.

Key Words: *Welfare-State, Social Protection, European Union, Conditional Convergence, Panel Data Estimation*

JEL Classification : *H53, O52, C23*

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1. Introduction

Following the established economic theory of convergence, the economic development level of LDC's (Less Developed Countries) should approach the advanced countries level with the same economic resources[2]. Therefore, we need to investigate the levels of social protection expenditures that characterize the social convergence process among EU countries. In this work, then, we evaluate the presence of convergence in social protection (SP) in the EU-15 case, and identify the most significant conditional macro-economic factors that while influencing this convergence process, perform, in fact, differently between sets of EU countries. To this very purpose, we select a set of basic macro-economic variables most commonly applied in similar research, namely: GDP growth rate, unemployment and the dependency ratio.

We are certainly much worried about the upcoming European welfare status issue, given the significance of a downward convergence in state welfare provisions due to serious and unfettered market forces and increased global competition. In other words, it is here also assumed that both the risk of capital flight and outsourcing will develop into a "race to the bottom" in regulatory competition within the integrated economies of the European Union so that the current welfare state may have to carry the burden of economic austerity (Tanzi, 2002; Montanari *et al.*, 2007; Liapis *et al.*, 2013). Summarizing here, we can say that there is not much of a consensus in welfare state literature about the question of convergence or non-convergence and its underlying determinants, to the best, in fact, of our knowledge.

The aim of the paper is first, to analyze the social protection convergence issue within the EU-14, (the EU-15 excluding Luxembourg), second, to show the dynamics of social protection expenditure in the European Union as a whole, and in two distinct groups of countries the Southern EU-4 countries (Greece, Italy, Spain and Portugal) and the remaining Northern EU-10 countries, third, using panel data estimations to examine the welfare incidence of country's economic growth, unemployment rate, country's openness and national debt finally, to examine

[1] Following Sala-i-Martin (1996a), absolute β-convergence implies that incomes across countries approach the same steady state level; whereas, conditional convergence implies that different economies converge to different steady state levels depending on cross section differences in savings rates, technology, population growth, etc.

whether or not the convergence inference remains robust independently of the protection index used[3].

The paper is organized as follows: Section II exposes briefly the *β*-convergence concept, Section III presents the dynamics of Social Protection Expenditure in the EU-10 and the EU-4 (1990-2009), Section IV analyzes our modeling approach and the relevant data used, next Section V describes our research results and, last Section VI, presents our concluding comments and further research suggestions.

2. The Convergence Hypothesis and Relevant Background

In the growth literature, two fundamental notions of convergence are the "absolute" and the "conditional" convergence. Applied to social protection, "absolute" convergence implies that there is an underlying common steady level of per-capita welfare expenditure to which nation-specific policies are converging. If so, there must be an inverse relationship between the initial value of per capita social expenditure and its growth rate. In fact, if β-convergence holds for all i nations (i=1,2,...M), the welfare dynamics can be expressed according to the well-known relationship:

$$g_{i,t,t+T} = a + \beta\, y_{i,t} + \varepsilon_{i,t} \tag{1}$$

where, the left-hand side is the average annual growth rate of social protection expenditure in country *i* at time *T*, α is a constant term and ε is the error term. The parameter β is a measure of β-convergence. If this assumption is checked for welfare expenditures, then it would indicate that countries with initially low levels of SP expenditure would experience faster SP expenditure growth than countries whose levels of expenditures have reached a certain stage of maturity. It follows that, regardless of their economic, social and institutional characteristics, all countries in the sample converge to the same steady state.

"Conditional" convergence implies differentials in a country's steady state level based on cross section differences in factors as the dependency ratio, unemployment rate, economic growth, etc.

Alonso et al. (1998) were the first to test the assumptions of σ and β−convergence in the field of social protection. Based on cross-sectional and panel data estimations for 11 countries of the EU, over the period 1966-92, the authors show a certain degree of convergence of per capita social protection expenditures, for the two sub-periods 1966-74, 1978-86 and 1986-1992 and a process of divergence for the remaining sub-period 1974-1978.

[2]Luxembourg was excluded as it is typically considered an outlier.

We mention here also the work of Attia & Berenger (2009), who questioned the existence of convergence among the different social welfare systems in Europe and the impact of the Maastricht Treaty upon this social process. Social protection is viewed with reference to pensions, health and employment. Their conclusions are straightforward that the welfare state in Europe is receding, calling upon market solutions and mechanisms, where the social convergence process seems quite clear within the Union itself. Since EU stands up as a strong player in the globalized acute competition, it is evident that, after Maastricht, Europe itself accepted the fact that the economic and monetary union imposes a very strict budgetary constraint, which in fact makes all welfare expenses even more difficult to meet.

Caminada et al. (2010) applied several σ and β convergence tests, using a set of social protection indicators, namely social expenditures, replacement rates of unemployment benefits, social assistance benefits and poverty indicators. They found strong convergence of social expenditure in EU countries, over long time periods; whereas, this strong convergence seems to have stagnated in recent years. Moreover, they also conclude that replacement rates of unemployment benefits clearly converge to a higher level, but social assistance benefits and poverty rates do not show any convergence trend.

In a broader picture, Starke et al. (2008) examined whether OECD welfare states have converged ever since 1980. Their findings are that although there is evidence of moderate welfare state convergence, it is in fact quite limited in magnitude. It is also quite varying in directionality and contingent upon the scientific indicator under examination. Their important outcome is that there is no strong evidence either for a "race to the bottom" or for the "Americanization of the Social Policy", the two most common convergence scenarios. Their main finding ends up to that most measures are indicative of convergence and, in particular, that this holds for the various indicators of social expenditure, which exhibits an upwards trend over time. What needs special attention here, with respect to the aforementioned research and ours as well, is the clear claim of the authors that although they can herald limited convergence at best, they cannot reject the interesting possibility of the emergence of regional "convergence clubs" as it seems to be our research case here (i.e. the EU-15 case, indeed).

In this direction, Corrado et al. (2003) use fixed effects and composed coefficients models based on the inclusion of dummy variables to reflect the interaction between country specific factors and welfare policies.

Last, but not least, we mention the work of Bouget (2003) where he stresses most emphatically, the very ambiguous evidence of convergence due to many methodological problems and difficulties of interpretation of the social indicators.

Moreover, he supports the idea of "adjustment" reforms rather than the existence of radical changes in the transitional period examined (1980-1998).

In fact, the differences between welfare states can be established using a number of indicators, each of them focusing on a certain aspect of the welfare state. Paetzold (2012) investigates the convergence of welfare state indicators in Europe, applying panel data analysis. He relied upon pension and unemployment net replacement rates, as well as on public social expenditures, as particular social – welfare indicators, using a sample of 14 EU economies (EU-15, excl. Lux.), between 1980 and 2005. His empirical findings reveal a convergence process, with strong cutch up characteristics of social protection levels in the Southern States. But, our research interest here is to question "what scientific perspective lies behind Paetzold's particular selection of these social protection indicators, while analyzing the quite important welfare convergence issue among EU member states?", given the very serious opposing propositions that exist (see Iversen and Cusack 2000; Taylor-Gooby 2004 from one side and, Huber and Stephens 2001, Pierson 1996; Korpi and Palme 2003, on the other; as Paetzold also develops his arguments, p. 2).

The main point is that he, quite clearly, acknowledges that given the all serious institutional differences among European States, he needs to pursue an analytical strategy that is based upon the convergence of welfare efforts and outputs (Paetzold, p. 2). This approach, he claims, follows the welfare convergence analysis proposition that it may not be all that important if institutional designs are that different, as long as they deliver similar outcomes.

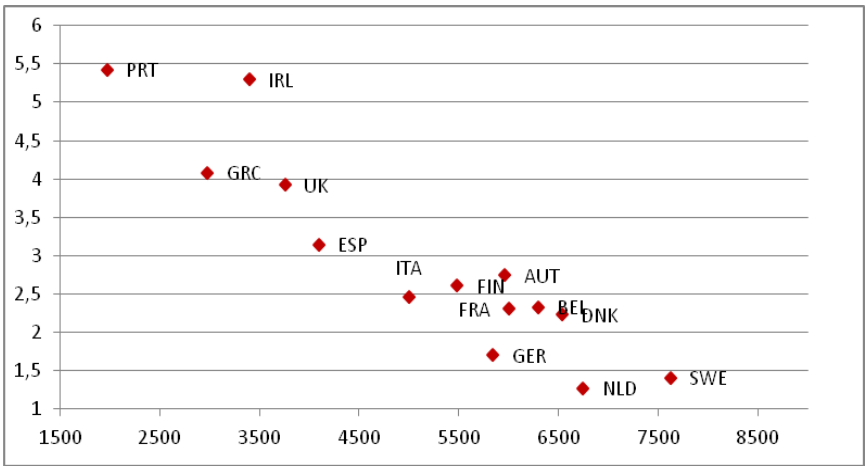
We further agree to this significant proposition and employ this fundamental research direction here. Moreover, we also fully agree to his research direction in that we too try to provide a first step analysis towards the application of the state-of-the-art econometric techniques on data including certain replacement rates; while, quite obviously, many further analysis' steps are definitely needed in the near future. We further note here that several groups among these countries are related, in general, to disparate levels of wealth, different social protection systems, demographic idiosyncrasies, unemployment rates and other relevant economic factors. These factors in perspective, we try to include as fundamentally representative of the social protection convergence issue, within the EU-14 research case here, by placing particular emphasis upon the role of the GDP growth rate, as a proxy for the financial capacity of the system, unemployment as a proxy for the demand for social security benefits and the dependency ratio as a proxy for the country's socio-demographic characteristics.

3. The Dynamics of Social Protection Expenditure in the EU-10 and the EU-4 (1990-2009)

Our analysis focuses upon two specific indicators of social protection (SP) expenditure: the social protection expenditure as a percentage of GDP (SPGDP) and the per capita social expenditure (SPPC), at PPS units and constant prices (2000), both expressed in a logarithm form, from a sample of 14 EU Member States over the period 1990-2009. These two particularly chosen indicators measure the level of (SP) according to two different approaches. Namely, in our first approach, (SPGDP) indicates the effort carried out by a country, with regard to the (SP) in terms of the share of the national wealth devoted to SP. In our second approach, (SPPC) is expressed at PPS and constant prices that can be designated as an indicator of the level of well-being and protection of a country's inhabitants. Viewed in this way, SPGDP can then be interpreted as an indicator of means; whereas, SPPC can be conceived as an indicator of outcomes (See also Attia and Valérie Berenger p. 474)[4]. Figure 1 shows the scatter plot of the average countries' growth rate of per-capita social protection expenditure (vertical axis) versus the initial per-capita Social Protection expenditure (horizontal axis) for the period 1990-2009. The inverse association between the initial per capita Social Protection expenditure and its annual growth rate indicates that, countries with initially low levels of SP expenditure experienced faster SP expenditure growth than countries whose levels of expenditures have reached a certain stage of maturity. More specifically, as "extreme cases" appear Portugal and Ireland reporting the highest annual growth rate 5.4% and 5.3%, whereas, Sweden and Netherlands present the lowest 1.3% and 1.4% respectively.

[4] Even though these two particular indicators are obviously linked, they do not need to coincide inevitably, because their divergence can reveal the influence of the GDP per capita.

Figure 1: Real Pc Social Expenditure and its Growth in EU-14, 1990-2009



Source: Authors' calculations

As it concerns the Social Protection expenditure in the European Union as a whole, shows a significant increase during the period 1990-2009. In terms of per capita level, social protection seems to move in a parallel way in the two groups of countries (Figure 2a).

Contrary, investigating the behavior of the social expenditure in terms of percentage of GDP, two distinct patterns of movement can be seen. More than that, it seems that a catching up convergence indicator exists by the Southern EU States, considering Spain, Portugal, Greece and Italy (more or less) altogether as a group (Figure 2b). This EU group of countries experienced a significant improvement with the social protection expenditure as percentage of GDP rising from 17.2% of GDP in 1990 to 25.8% in 2009. The respective movement in the South Europe presents ups and downs. It seems that adhesion to Maastricht criteria led politician decision makers to implement fiscal consolidation programs causing a slowdown in social expenditures after 1993. It is also clear that, especially in the years of global crisis, an upward trend in social expenditure as a percentage of GDP in South as well as in North Europe can be seen, partly due to the decrease of GDP and partly to the increased demand for social security benefits conditioning by a rise in the unemployment rate. However, the significantly higher increase of Social Expenditure as percentage of GDP -ratio of Social Protection expenditure to GDP- in South Europe, must be seen by caution, as it may be attributed mainly to lower growth rates of GDP in this group of countries after 1990 and not to a rise in Social Protection expenditure.

Figure 2a. SPPC in EU-10 & EU-4, 1990-2009

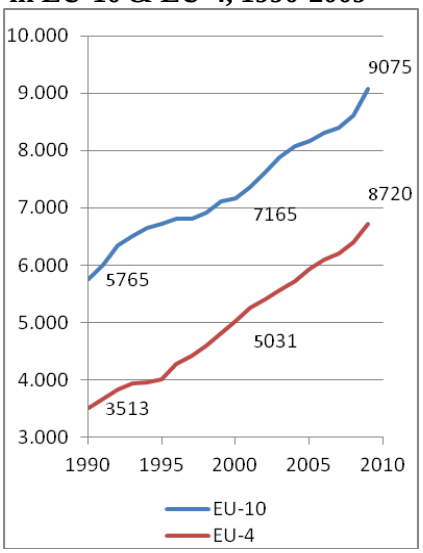
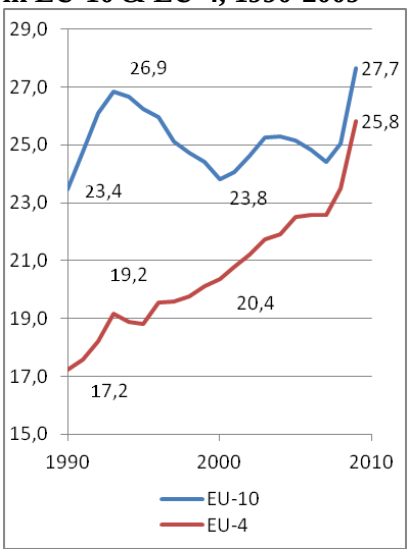


Figure 2b. SPGDP in EU-10 & EU-4, 1990-2009



Source: Authors' calculations

4. Econometric Framework and Model Specification

The main question to answer is whether there is an empirical evidence of a catching up process towards a single welfare state regime in EU-14. To analyze whether there is any convergence in per capita as well as in terms of percentage of GDP welfare expenditure in EU-14 countries, we test the β-convergence hypothesis using panel data techniques[5].

The superiority of panel data methods over cross-country growth regressions has been stressed (Islam, 1995). The panel data analysis is also preferred as it takes into account the heterogeneity into the units of analysis by allowing individual-specific

[5] The first research efforts on convergence are cross-sectional studies that generally support the "Convergence Hypothesis" (Baumol, 1980; De Long, 1988; Grier and Tullock, 1989; Barro, 1991; Barro and Sala-i-Martin, 1992; Sala-i-Martin, 1996b). Time series convergence tests focus upon the notion of "Stochastic Convergence" where per capita income disparities among economies should follow a stationary process (Bernard & Durlauf, 1995; 1996).

variables (Frees, 2004) and, it can additionally capture the influence of certain periods in which there was an unusual growth performance, such as economic recession associated with financial crisis, by including dummy variables in the panel regression[6].

With respect to specification choice, we comparatively use the Pooled OLS, the Fixed Effects and the Random effects model. However, we have to consider several things that can make OLS biased in panel data models. This model implies that the intercepts and each of the slopes for all equations are the same and that the omitted factors are not correlated with one another and that they have the same variability. In other words, there is no autocorrelation and the variances are homoscedastic. Otherwise, autocorrelation and heteroskedasticity produce bias in standard error estimates, leading to incorrect statistical inferences. To deal with these problems, fixed effect model and random effect model can be used (Gujarati, 2003).

Fixed effect model assumes that independent variable and error term is correlated, while random effect model assumes that error term is independently and identically distributed. However, there could be bias in estimation if correlation between fixed effect and independent variable exists. Therefore, appropriate model has to be decided based on Hausman test that compares fixed effect and random effect models. If the null hypothesis that there is no correlation between independent variable and error term is rejected through Hausman test, fixed effect model is more appropriate. Random effect model can be used when the null hypothesis is not rejected, which means that there is no such correlation.

In line with the arguments of Hsiao (1981), Baltagi (1995) and Greene (2000), the choice of fixed effects option is more appropriate when research focuses on a specific set of N countries, which are not drawn randomly from a large population, they share a few common characteristics and, outcomes of the study are viewed as conditional upon this set of countries, that is a situation which precisely reflects our convergence study here.

In this work, in a first step, we include three kind of domestic factors. The first factor corresponds to the economic growth rate (*GDP*) determining the financial capacity of the system. Our second factor is the unemployment rate (*UNEM*) depending upon the employment picture and conditioning the demand for social

[6] Panel data research supports, in general, the convergence hypothesis (Islam, 1995; Caseli et al., 1996; Bassanini and Scarpetta, 2001; Bassanini et al., 2001; Sarajevs V., 2001; Borys et al., 2008; Cuaresma et al., 2008, Szeles and Marinescu, 2010).

security benefits. Our third factor accounts for the socio-demographic characteristics, represented by the dependency ratio (*DR*). According to the literature, this variable should have a positive impact on the growth of the welfare expenditures, because a rise in this ratio due to demographic aging increases the proportion of the voters demanding social transfers (Lindert, 1996; Alsasua et al., 2007). In a second step, to condition the model on the different welfare regimes, we included interaction terms which try to examine the effect of the welfare regimes on the SP expenditure dynamics. All countries have been grouped on the basis of the Esping-Andersen (1990), classification of welfare states as follows:

Liberal (UK, IRL);
Social-Democratic (SWE, NOR, DNK, FIN);
Corporatist (AUT, BEL, GER, LUX, NLD, FRA);
Southern-European (ITA, ESP, PRT, GRC).
Accordingly then the specification used is the following:

$$\Delta lnSPCEXP = \alpha_o + \beta\, lnSOCEXP_{-1} + \alpha_1 \Delta DR_{-1} + \alpha_2 \Delta UNEM + \alpha_3 \Delta GDP \quad (2)$$

In Table 2 variable description together with the data sources are presented.

Table 1. Variables Description and Data Sources

SPPC	Per capita, Social Expenditure, at constant prices (2000) and constant PPP (2000), $	OECD
SPGDP	Social Expenditure as percentage of GDP	OECD
DR	Age dependency ratio (%of working-age population)	OECD
UNEM	Unemployment, total (%of total labour force)	WB
GDP	Real per capita GDP at constant prices (2005)	UNCTAD
DSPC	DS* SOCEXPPC (Socialdemocratic group effect)	
DLPC	DL* (Liberal group effect)	
DSEPC	DSE* SOCEXPPC (Southern European group effect)	
DSGDP	DS* SOCEXGDP (Socialdemocratic group effect)	
DLGDP	DL* SOCEXGDP (Liberal group effect)	
DSEGDP	DSE* SOCEXPGDP (Southern European group effect)	
DUM 2008	Dummy for the year 2008 to account for the global crisis	

5. Empirical Results

Unit Root Test for Panel Data

Because our data is a panel data set, we perform unit root test for panel data to avoid spurious regression. There is a variety of tests suggested by various economists in the literature. In this paper, Im, Pesaran and Shin W-Statistic, ADF-Fisher Chi-

Square and PP-Fisher Chi-Square tests were used to check whether the panel data contain unit roots. The results suggest that, per capita SP expenditure, SP expenditure as percentage of GDP and Unemployment variables are integrated to order one, so we used them in first differences. Also, dependency ratio and GDP per capita are used in second differences.

Table 2. Panel Unit Root Tests

	Im, Pesaran and Shin W-stat		ADF - Fisher Chi-square		PP - Fisher Chi-square	
Variable	Statistic	Probability	Statistic	Probability	Statistic	Probability
SPPC	6.34880	1.0000	9.48631	0.9996	20.9930	0.8256
Δ(SPPC)	-5.81694	0.0000	87.4769	0.0000	86.9465	0.0000
SPGDP	1.62175	0.9476	24.3957	0.6605	36.3957	0.1328
Δ(SPGDP)	-2.67932	0.0037	52.4838	0.0034	49.6423	0.0071
DEPEND_RATIO	-0.61650	0.2688	70.9323	0.0000	58.4071	0.0006
Δ(DEPEND_RATIO)	-1.21872	0.1115	40.7477	0.0566	25.6332	0.5932
Δ^2(DEPEND_RATIO)	-2.49934	0.0062	64.5067	0.0001	16.0349	0.9653
UNEMPL	-1.91395	0.0278	46.4430	0.0157	27.4707	0.4927
Δ(UNEMPL)	-5.09474	0.0000	76.4818	0.0000	65.2232	0.0001
GDP_PC	-1.65156	0.0493	36.5060	0.1302	10.9458	0.9984
Δ(GDP_PC)	0.69657	0.7570	23.5628	0.7044	13.0871	0.9925
Δ^2(GDP_PC)	-2.93116	0.0017	59.6067	0.0005	67.1430	0.0000

Testing for Convergence

Applying panel data analysis, our estimates here employ annual data. The results of the absolute welfare convergence are reported in Table 3 that compares the Pooled OLS, the fixed effect and the random effect estimates. Fixed effects are tested by the incremental F test, while random effects are examined by the Lagrange Multiplier (LM) test (Breusch and Pagan, 1980). If the null hypothesis is not rejected, the pooled OLS regression is favored. The Hausman specification test (Hausman, 1978) compares fixed effect and random effect models.

Absolute Convergence

Dependent variable here is the rate of variation of per capita Social expenditure. With the exception of the Fixed Effects model where the estimated coefficient is insignificant, the estimated coefficient of the lagged dependent variable being negative and significant provides evidence of absolute convergence. According to the tests appearing in the Table below, the Pooled OLS seems to be the appropriate model (Table 3).

Table 3. Absolute Convergence in EU-14, 1990-2009

	Dependent variable: Δ_l_SPPC		
Independent variable	Pooled OLS	Fixed Effects Model	Random Effects Model
constant	0,3186***	0,1873	0,3093***
$SPPC_{-1}$	-0,0332***	-0,0182	-0,0321***
N. Obs	266	266	266
R^2	0,1337	0,1482	
Model Test	F value=40,7314 p-value = 7,80e-10	F Test for No Fixed Effects F value=1,4257 p-value=0,1476	Breusch-Pagan p-value= 0,693 Hausman Test for Random Effects m value=2,9385 p-value=0,0865

Note: *, ** and ***, denote significance at 1%, 5% and 10% levels respectively.

Conditional Convergence

While controlling for the steady state and trying to highlight the particular impact of the other chosen factors here, we consider several specifications, to control for the robustness of the estimates. The results from the implementation with no group effects, in explanation of social protection convergence are displayed in Tables 4 & 5.

In all specifications, the coefficient of the lagged by one year dependent variable being negative and significant confirms the hypothesis of conditional convergence, whereas this coefficient appears higher in the Pooled OLS specification (Table 4). Furthermore, the Dependency Ratio (with the exception of the Pooled OLS), unemployment rate and per capita GDP, enter the models simultaneously with significant coefficient with the expected sign. More specifically, the per capita GDP seems to have the most important and negative effect on the per capita social expenditure. Contrary, the coefficient of the unemployment rate (*ΔUNEM*) is positive and significant, proving that the needs for social transfers are sensitive to the state of the economic situation.

Table 4. Conditional Social Convergence in EU-14, 1990-2009

	Dependent variable: Δ_l_SPPC		
Independent variable	Pooled OLS	Fixed Effects Model	Random Effects Model
constant	0.2237***	0.2732***	0.2957***
$SPPC_{-1}$	-0.0625***	-0.0282**	-0.0308***
Δ^2DR	0.0036	0.0059*	0.0367*
ΔUNEM	0.0468**	0.0348***	0.035***
Δ^2GDP	-0.1695*	-0.2771***	-0.2577***
N. Obs		252	
Adj. R^2	0.2785	0.2439	
Model Test	F value=25.2261 p-value =1.56e-17	F Test for No Fixed Effects	Breusch-Pagan p-value= 0.619

		F value=1.8229 p-value=0.0405	Hausman Test for Random Effects m value=2.2058 p-value=0.698

Notes: Variables are expressed in log.*, ** and ***, denote significance at 1%, 5% and 10% levels respectively.

Random effects are examined by the Breusch-Pagan test. As the null hypothesis is not rejected, the pooled OLS regression is favored. Also, Hausman test fails to reject the null hypothesis that there is no correlation between independent variable and error term, with the value m=2.2058. This means that the estimated coefficients in the random effect model are unbiased.

In the fixed effect model, the result of F test for no fixed effect shows that the null hypothesis, which is that there are no fixed effects, is rejected at the 5% level, meaning that the pooled OLS model could be also biased because of the existing fixed effects. As a result, the fixed effect model, which is in the second column of the table below, was proved to be appropriate in this regression.

In Table 5, the convergence in terms of SP expenditure as percentage of GDP is indicated by the negative and significant coefficient of the lagged dependent variable.

Table 5. Conditional Social Convergence in EU-14, 1990-2009

	Dependent variable: Δ_l_SPGDP		
Independent variable	Pooled OLS	Fixed Effects Model	Random Effects Model
constant	0,1246***	0.1691**	0.1715***
$SPGDP_{-1}$	-0,0372***	-0.0513**	-0.0188***
Δ^2DR	0,0343*	0.0377*	0.0556**
ΔUNEM	0,1271***	0.1268***	0.1194***
Δ^2GDP	-0,807***	-0.7933***	-0.8596***
N. Obs	252	252	252
Adj. R^2	0.4998	0.5028	
Model Test	F value=63.6992 p-value = 6.12e-37	F Test for No Fixed Effects F value=1.1162 p-value=0.3459	Breusch-Pagan p-value= 0.7239 Hausman Test for Random Effects m value=5.9436 p-value=0,2034

Note: Variables are expressed in log.*, ** and *** denote significance at 1%, 5% at 10% levels respectively.

In all models, the explanatory variables enter the model with the expected sign and are statistically significant. More specifically, the rate of variation of the dependency ratio *ΔRD* carries a positive and significant incidence on the welfare expenditure

growth. The result is what one might expect insofar as the increase in this ratio takes into account both the pressure due to demographic aging and that related to the decline of the fertility rate in the majority of the European countries. In the same way, the coefficient of the unemployment rate (*ΔUNEM*) is positive and significant. Random effects are examined by the Breusch-Pagan test. As the null hypothesis is not rejected, the pooled OLS regression is favored. Also, Hausman test failing to reject the null hypothesis that there is no correlation between independent variable and error term, with the value m= 2.2058. This means that the estimated coefficients in the random effect model are not biased.

In the fixed effect model, the result of F test for no fixed effect shows that the null hypothesis of no fixed effects can't be rejected at the 5% level, meaning that the pooled OLS model is unbiased and as such more appropriate in this regression.

Accounting for Group and Time Effects

These above results can be more deeply analyzed in the two next models, which account for group effects related to the different welfare states (Tables 6 and 7). Both models have been estimated using the fixed effect methodology through which we test the hypothesis that the effect of per capita GDP on welfare growth in per capita as well as percentage of GDP is different under different welfare regimes. In our specifications the fixed effect methodology is preferred to random effects for two reasons. First, since we utilize data from 14 particular EU countries, our observations cannot be treated as being a random sample from a large population. Thus, it seems more reasonable to consider that a separate intercept should be estimated for each country (Wooldridge, 2006). Second, in all of our regressions the null hypothesis that there is no correlation between independent variable and error term is rejected through Hausman test, suggesting that the fixed effect model is more appropriate.

Here, looking at the parameter values, we note that independently of the indicator of SP taken in to account, a significant positive contribution to the growth in welfare expenditure of all the regimes is detected (Table 6).

Table 6. Panel Estimates: Group-Effects and Time Effects

	Dependent variable: Δ_l_SPPC	
Independent variable	Fixed Effects Model	
	Group effects	Group and Time effects
constant	0,3547*	0,3105*
$SPPC_{-1}$	-0,1678**	-0,1619**
DLPC	0,1988***	0,196***
DSPC	0,1948***	0,1965***
DSEPC	0,1639**	0,1608**

DUM 2008		-0,0102***
N. Obs	266	266
Adj. R^2	0,3081	0,3115
Model Test	F Test for No Fixed Effects F value= 5,654 p-value= 4,7875e-009	F Test for No Fixed Effects F value= 5,6348 p-value= 5,25546e-009

. *Note:* *, ** and *** denote significance at 1%, 5% at 10% levels respectively.

However, this contribution is lower in the Southern Eastern European countries. In other words, "the country i which belongs to the Southern European group" increases less the expected welfare expenditure. This result allows us to say that each group posses its own institutions pattern, welfare policy and social demand for protection policy that define different dynamics within each of the four welfare regimes. This finding is also confirmed by the result of F test, where the hypothesis of no fixed effects is rejected at the 5% level. We next proceed by including a time dummy variable for the year 2008. The negative and significant coefficient of this variable indicates that the global crisis had a negative effect on the SP convergence process. However, this is not the case when the SP expenditure as percentage of GDP is considered, as the coefficient appears to be non significant.

A second point to note is that when we consider the SP expenditure as percentage of GDP as a measure of Social Protection, the role of the variables that refer to the welfare regime appears to be very strong in the explanation of SP convergence process as it is indicated by the value of R^2 (Table 7). More specifically, the 78.19% of the variation of the growth on the SP expenditure as percentage of GDP is explained by the lagged dependent variable and the variables welfare regimes, whereas the corresponding value in the case of the per capita SP growth is significantly lower (30.81%).

Table 7. Panel Estimates: Group-Effects and Time-Effects

	Dependent variable: Δ_l_SPGDP	
Independent variable	Fixed Effects Model	
	Group effects	Group and Time effects
constant	1,7689***	1,7654***
$SPGDP_{-1}$	-0,7360***	-0,7346***
DLGDP	0,0446***	0,0445***
DSGDP	0,0281***	0,0281***
DSEGDP	0,0377***	0,0376***
DUM 2008		0,0034
N. Obs	265	265
Adj. R^2	0,7819	0,7814
Model Test	F Test for No Fixed Effects F Value= 69,8721 p-value= 6,18046e-075	F Test for No Fixed Effects F Value= 68,5338 p-value= 5,61867e-074

*Note: *, ** and *** denote significance at 1%, 5% at 10% levels respectively.*

5. Conclusion

The main purpose of this paper was to analyze the issue of social convergence in the European Union. Examination of the dynamics of social protection expenditure in the Southern-EU4 countries and the Northern-EU10 countries, revealed two distinct patterns of movement of the social expenditures, as a percentage of GDP. To check for the robustness of our results we used panel data techniques.

With the exception of the Fixed Effects specification, evidence of absolute β-convergence was found independently of the indicator considered. To test for the conditional social convergence hypothesis, we proceed by taking into account a number of factors that may influence the convergence process. Our results confirm that the social convergence process, both in per capita and in percentage of GDP terms, indeed occurred over the period 1990-2009. More specifically, the unemployment and the dependency ratio, appear to exhibit a significant positive impact on the welfare convergence.

In contrast, the economic growth appears to exhibit a significant negative impact on the social protection expenditure growth.
In the next step, our results were deeply analyzed, by means of the Fixed Effects specification, accounting for the group effects related to the different welfare regimes. Thus, it seems that each group posses its own institutions' pattern, welfare policy and social demand for protection policy, that indeed define different dynamics within each of the four welfare regimes.

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