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E C O N O M I C S B U L L E T I N

Towards a Common EU Policy on Income Distribution: the case of Social Benefit Expenditures

emmanuel mamatzakis
Proffessor, University of Macedonia, Dept. Economics

Panos Fousekis
Professor, Aristotle University, Dept. Economics

Abstract

The observed "soft" coordination at European and national level has hindered progress in terms of raising social welfare and reducing the risk of poverty in EU. This is a source of concern given that the fruits of economic efficiency should be shared by the individuals and Member States of EU in an equitable manner. Raising social welfare would assist the process of building up the necessary social consensus in favour of structural reforms in product and capital markets, which in turn would further enhance economic efficiency. This paper focuses on a key indicator of social policy in national agendas which is the social expenditure as a percent of the GDP so as to assess whether there is convergence in social policy across European countries. The empirical analysis utilises information from 18 European countries over the period 1990-2004 and appropriate methodological tools of absolute ó-convergence and analysis of distribution dynamics.

P. Fousekis: Aristotle University of Thessaloniki, Department of Economics and E. Mamatzakis: University of Macedonia, Department of Economics, e-mail: tzakis@uom.gr
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1. Introduction

The EU has taken huge strides towards an integrated economy through the creation of the single market and the introduction of the euro. Undoubtedly, the social and economic benefits of this process of integration would produce gains in terms of higher GDP, of more jobs and of improving welfare. As reported in a recent report of European Commission (2005a) completion of a single market in services is expected to lead to an increase of GDP by 0.6% and employment by 0.3% over the medium term. To accelerate the process of integration and improve economic efficiency Lisbon strategy was launched in March 2000 by the Spring EU Council, setting a ten-year time table to make the EU the world's '*most dynamic and competitive economy'*. Five years later, Europe appears to come in terms with the ambitious time table of meeting the targets of Lisbon strategy as failing coordination at European and national level together with sometimes conflicting priorities have hindered delivery (European Commission 2006a). As a result the European Commission (2006a) proposed to the European Council**,** as well as the European Parliament and the European social partners, to re-launch and refocus the Lisbon Strategy towards *'working together for growth and jobs'*. The proposal was accepted by the Council and EU Parliament, while a progress report acknowledged that promising forward steps have taken place (see European Commission, 2006b).

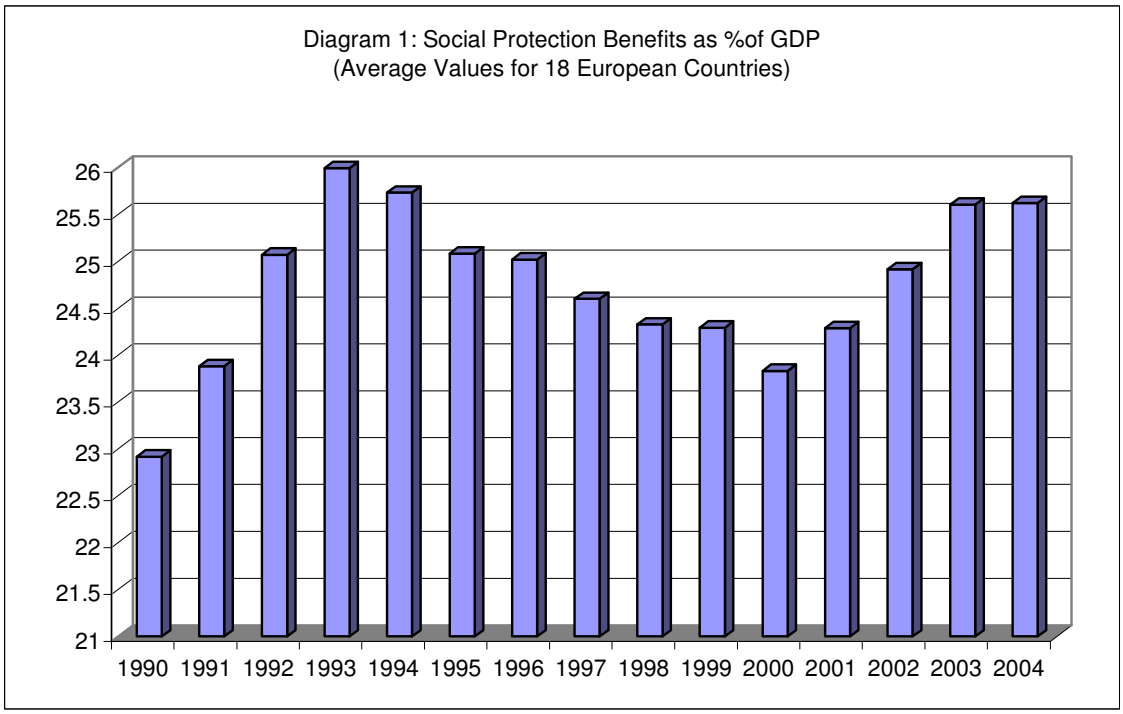
Although, the re-launch of Lisbon Strategy identifies the importance of raising social welfare and create jobs as a prerequisite in order to build the necessary social consensus for successfully implementing reforms that would in turn enhance economic efficiency, the need for further action in the area of social policy remains high. As noted by Bertola (2003) while in the economic front there has been *"positive integration"* though explicit collective arrangements, social policies have been dealt with a *"soft"* and *"open"* coordination process. Effectively, this implies that social policy lacks coordination at European and national level. This certainly is a source of concern since markets are not well equipped to handle income risks and the gains of economic efficiency do not need to be shared in an equitable way across individuals and European countries.

In particular, given the soft coordination of social policies in Europe one needs to assess these policies at national level. In turn, national governments address the problems associated with income inequality and poverty through social transfers. The share of social expenditures in a country's GDP is considered to be a rough indicator of social concerns in the national policy agenda (e.g. Bertola, 2006). This study focus on this particular indicator in order to assess whether there is an on going process of convergence in social expenditures in Europe. To this end, it relies on information from a cross-section of European countries over the period 1994-2004 and two methodological tools. The first is the notion of σ-convergence (e.g. Friedman, 1992; Lichtenberg, 1994) which means narrowing of an appropriate index of inequality overtime. The second is notion of distribution dynamic relating to changes in the external shape of an evolving cross-section distribution over time as well as to intra-distribution dynamics such as mobility, persistence and club formation (e.g. Quah, 1993).

In what follows, section 2 presents the data and section 3 the methodological framework. Section 4 presents the empirical results, while section 5 concludes.

2. The Data

The data for the empirical analysis come from Eurostat (2006) and refer to 18 European countries (15 EU member states plus Norway, Iceland, and Switzerland). Diagram 1 shows the cross-sectional average of the variable of interest for each year of the sample. Average social expenditure as a percent of the GDP increased rapidly from 1990 to 1993 but followed a downward trend for a prolonged period of time from 1994 to 2000. Since 2000 this trend appears to be reversed, but stabilizing at lower level than the one of 1993. Given that it is well evident that income inequality has been increasing over the period considered in this study (e.g. Bertola 2003 and 2006), the depicted decline of social protection benefits has an impact on income inequality and poverty. It is also worth noting that the period of declining social protection benefits coexisted with the period of the required nominal economic convergence prior to the adoption of the common currency. It is, therefore, of interest to examine whether there has been a convergence also in terms of social protection benefits in Europe over this period.



Source: Eurostat.

3. Methodological Framework

3.1 The σ-Convergence

As mentioned in the introduction σ-convergence takes place when an appropriate measure of inequality exhibits a downward trend over time. A number of

alternative measures of inequality are available in the literature (e.g. Sen, 1997). Here, we employ the variance which reflects absolute deviations from the cross-sectional average. A consistent test for absolute σ-convergence has been developed by Carree and Klomp (1997). The relevant test statistic can be computed as

$$T = (N - 2.5)\ln[1 + 0.25\frac{(\hat{\sigma}_1^2 - \hat{\sigma}_T^2)}{(\hat{\sigma}_1^2\,\hat{\sigma}_T^2 - \hat{\sigma}_{1T}^2)}] \qquad (1)$$

where N is the number of countries, $\hat{\sigma}_1^2$ and $\hat{\sigma}_T^2$ are the variances in the initial and the final year (respectively), and $\hat{\sigma}_{1T}$ is the covariance between the cross-section levels in years 1 and T. Under the null hypothesis ($\hat{\sigma}_1^2 = \hat{\sigma}_T^2$) the statistic follows the χ^2 distribution with 1 degree of freedom.

3.2 The Analysis of Distribution Dynamics

The analysis of σ-convergence provides information on just one parameter of an evolving cross-section distribution. Of equal importance, however, are the so-called intra-distribution dynamics which provide information on persistence and mobility, churning-like behavior within distribution where countries with initially low levels social expenditures catch up and even overcome high level ones. For the study of distribution dynamics we employ here transition probability matrices, as proposed by Quah (1993).

Let us denote the variable/stochastic process of interest (here social benefits as % of the GDP) by α and its cross-section distribution at time t by F_t. Associated with F_t is a probability measure λ_t, where $\forall\ y \in R : \lambda_t((-\infty, y)) = F_t(y)$. A simple model for the evolution of F_t or equivalently of λ_t is an autoregression in measures such that for every measurable set A it is the case that

$$\lambda_{t+1} = \int M(a, A)d\lambda_t(a) \qquad (2).$$

In (2), M is a '*transition kernel*', that is the transition density function, mapping λ_t into λ_{t+1} and trucking, thus, where in F_{t+1} points in F_t end-up (1993). Rewriting (2) as a convolution

$$\lambda_{t+1} = M * \lambda_t \qquad (3)$$

and iterating yields a predictor for cross-section distributions

$$\lambda_{t+s} = (M * M * ..... * M) * \lambda_t = M^s \lambda_t \qquad (4)$$

Taking (4) to the limit as $s \to \infty$ one can characterize the likely long-run or '*ergodic distribution'* of the stochastic process α. The transition kernel is usually estimated by taking discretizations of the probability measure λ_t, converting, thus, M into a *transition probability matrix*. M encodes information on intra-distribution dynamics that means information on *persistence* and *mobility*, switches in ranks between countries and distances traversed when such switches happen.

4.1. The Empirical Results

4.1 σ-Convergence

The test statistic presented in Equation (1) has been computed for the variances and the covariance of the initial (1990) and the final (2004) years in the sample. The empirical value of the test statistic turned out to be 11.97, while the theoretical values at the 5 and the 1 percent levels of significance are 3.84 and 6.63, respectively. Thus, the null hypothesis of no σ-convergence is rejected at any reasonable level of significance. Indeed, there is strong evidence that the dispersion of social expenditures as a percent of the GDP has been decreasing over the sample period.

4.2 Distribution Dynamics

Transition probability matrices with four states (0: lowest; 1: lower middle; 2: upper middle; and 3: highest) have been estimated using the TSRF econometric package (Quah, 2000). Table 1 presents the one-step, which is one-year, transition probability matrix for 1990-2004. The upper limits for each state have been determined by dividing the space of possible values into discrete cells such that there is roughly equal number of country/year observations in each cell. First row and the first column present the states and the associated with each state range of values. The remaining rows and columns contain the one-step transition probabilities defined as

$$P_{i,j}^{(t,t+1)} = prob(a_{t+1} \in j / a_t \in i) \qquad (5)$$

where $i, j = 0, 1, 2, 3$ denote states.

Table 1. The One-Step Transition Probability Matrix

States	**0** (13.16-21.35]	**1** (21.35-25.6]	**2** (25.6-27.9]	**3** (27.9-37.64]
0 (13.16-21.35]	0.89	0.11	0	0
1 (21.35-25.6]	0.03	0.77	0.20	0
2 (25.6-27.9]	0	0.14	0.77	0.09
3 (27.9-37.64]	0	0	0.07	0.93

Source: Authors' Estimations.

The elements in the main diagonal provide information about mobility or persistence. According to the results, 89 percent of countries in state 0 in any given year will end up in the same state in the immediately following year. For state 3 the relevant figure is 0.93, while for states 1 and 2 the figures are somehow lower, 0.77. We conclude therefore, that one year persistence has been very strong for the countries with the highest and the lowest benefits, while mobility has been relatively easier for the lower and the upper middle ones. The off-diagonal elements provide information on the type of mobility upwards or downwards. For example, the probability that a country in state 2 will transit to state 3 is 0.09 and the probability that it will transit to state 1 is 0.14.

The k-step transition probability is defined as

$$P_{i,j}^{(t,t+k)} = prob(a_{t+k} \in j / a_t \in i) \qquad (6)$$

Table 2 presents the 5-step transition probability matrix obtained by iterating the one-step matrix 5 times.

Table 2. The Five-Step Transition Probability Matrix

States	**0** (13.16-21.35]	**1** (21.35-25.6]	**2** (25.6-27.9]	**3** (27.9-37.64]
0 (13.16-21.35]	0.271	0.318	0.283	0.127
1 (21.35-25.6]	0.093	0.288	0.355	0.264
2 (25.6-27.9]	0.058	0.249	0.345	0.348
3 (27.9-37.64]	0.021	0.151	0.284	0.544

Source: Authors' Estimations.

As expected, mobility is much higher in a five-year horizon. This is especially true for states 0, 1 and 2. However, almost 55 percent of countries in state 3 will remain in that state after five years. An aggregate measure of mobility proposed by Shorrocks (1978) can be calculated as

$$I_s = \frac{N - tr(P)}{N - 1} \qquad (7),$$

where N is the total number of states and *tr(P)* is the trace of the one transition probability matrix, and it can be decomposed into upwards and into downwards mobility measures (Gang et al., 2004). Here the aggregate measure of mobility is 0.231, while upwards mobility is considerably higher than downwards mobility, 0.13 vs. 0.08.

The ergodic distribution is unconditional in the sense that it gives the probability that a country will occupy a given state in the long-run, independently of the state it belonged in the initial period. Table 3 presents the ergodic along with the initial (1990) distribution.

Table 3. Ergodic and Initial (1990) Distribution

States	Probabilities	
	Ergodic	Initial
0	0.065	0.333
1	0.224	0.444
2	0.319	0.167
3	0.392	0.056

Source: Authors' Estimations.

As far as the ergodic distribution is concerned, the balk of the probability mass, 71 percent, is concentrated in states 2 and 3. In the initial distribution, however, the probability mass, 78 percent, was concentrated in states 1 and 2. In other words, with the time the distribution of social protection benefits changes from a distribution with a long right tail to the one long left tail. This is perfectly consistent with the fact that upwards dominates downwards mobility.

A relevant question is how fast the actual distribution approaches the steady state one. This can be assessed from the system's *half life* obtained as:

$$hl = -\frac{\ln 2}{\ln|\lambda_2|} \qquad (8)$$

where λ_2 is the second eigenvalue of the one-step probability matrix. Here, the half-life is 7.8 years indicating a rather fast pace.

Of certain importance is the knowledge of the time required for transitions from one position of the benefits distribution to another. This can be empirically investigated using the notion '*first passage time'* (Narayan Bhat, 1972). Let $f_{ij}^{(n)}$ is the probability that the first visit of the process to state j when it begun from state i will take place in n steps. Formally,

$$f_{ij}^{(n)} = prob(a_n \in j; a_r \notin r \ (r = 1, 2, ..., n-1) / a_0 \in i) \qquad (9) .$$

The expected value of the first passage time is then

$$F_{ij}^{(n)} = \sum_{n=1}^{\infty} n f_{ij}^{(n)} \qquad (10).$$

Here we consider transitions from 16.54 percent (average value for Ireland which remains in all years in state 0) to 26.3 per cent (average value for EU-15), and from 26.3 to 32.9 percent (average value for Sweden which is in all years in state 3). For comparison purposes we consider both transitions to higher values as well as transitions to lower values. Table 4 presents the results.

Table 4. Expected First Passage Times

	Subsequent Level			
Initial Level	26.3	32.9	26.3	16.54
16.54	**14.28**			
26.3		**23.52**		
32.9			**13.32**	
26.3				**144.78**

Source: Authors' Estimations.

It appears that transitions to the EU average either from above or from below take less time compared to those from the EU average to the tails of the benefits distribution, especially the lower one. It is worth noting that it would take, on average, 145 years to transit from 26.3 to 16.54.

5. CONCLUSIONS

While the economic process is one of "positive integration", social policy is currently lacks strong coordination at European and national level. This is a source of concern since an efficient allocation of the economic activity does imply equitable income distribution *ex post*. This paper focuses on the evolution of social expenditures as a percent of the GDP which is a key indicator of the importance of social concerns in national policy agendas. Both the absolute σ-convergence as well as the analysis of distributions dynamics of the variance of interest for 18 European countries over the period 1990-2004 indicated that there is a movement towards a common model of social expenditures.

The amount spent on reducing inequality and providing poverty relief is one aspect of social policy. The other is the effectiveness of social spending that means the reduction in inequality and/or in poverty induced by a given level of spending. Further research, therefore, would examine the relationships among key variables such as inequality and per capita income, poverty and poverty relief, and social transfers and poverty relief. That type of analysis would rely both on standard parametric econometrics (e.g. regression analysis) and on modern non parametric econometrics which can yield information on how the entire cross-section distribution of inequality or poverty responds to a change in the level of social spending.

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