Patterns of social protection expenditure in the European Union

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April 1998

Abstract

This paper compares the patterns of social protection expenditure among the countries of the European Union during the period 1980–94. During such period, social protection looks not just like a "normal good" but rather like a "luxury", as expenditure increases more than proportionally with GDP per-capita.

The picture becomes more complicated when social protection expenditure is broken down by category or "function". Some patterns of the data are easily recognized. For example, the functions Old age/survivors and Sickness represent almost always the main components of expenditure and are among the most dynamic in many countries. Other patterns are harder to detect and a more formal statistical analysis is needed.

To this purpose, we fit a linear fixed effects model to social protection expenditure by function. The model allows for a set of time-varying covariates, including per-capita GDP and various indicators of demographic structure and labor market conditions, and for time-invariant country-specific effects. The results obtained confirm that most functions of social protection look like "normal goods", but offer little support for the hypothesis that they are "luxuries". It appears instead that a significant fraction of the increase in the ratio of social protection expenditure to GDP is related to the sharp increase in male unemployment rates during the period considered. It remains an open problem to determine the causal direction of this relationship.

Although a substantial fraction of the cross-country variability in expenditure may be attributed to differences in the level of income, the age structure of the population and the labor market conditions, there are important differences that our statistical model leaves unexplained. In particolare, our model is unable to explain the relatively high level of expenditure on Employment in Denmark, on Old age/survivors in Italy, and on Disability in the Netherlands, and the relatively low level of expenditure on Sickness in Greece, on Old age/survivors in Ireland and Portugal, and on Family/maternity in Spain.

*This paper is part of a research project financed by Fundación BBV under the title "Reforming the Spanish Social Security system". An earlier version of the paper was presented to the TMR-SFB504 Conference on "Saving, Pensions and Portfolio Choice", Deidesheim, March 5–7, 1998. I wish to thank Rob Alessie, Axel Börsch-Supan and Pierre Pestieau for helpful comments.

1 Introduction

In the last decades, expenditure on social protection programs has become one of the fastest growing components of GDP in most developed countries, raising concerns about its impact on public finances and its long-run sustainability in the light of current demographic trends. This paper focuses on the countries of the European Union (EU) and examines the patterns of social protection expenditure during the period 1980–94 as they emerge from the European System of Integrated Social Protection Statistics (ESSPROS). Our aim is threefold. First, we want to provide a quantitative assessment of the main differences between EU countries. Second, we want to look for evidence of convergence in expenditure patterns across the EU. Third, we want to study to what extent cross-country differences may be related to observable differences in the demographic structure, the labor market conditions and the income levels.

According to the definition adopted by the Statistical Office of the European Communities (Eurostat), "social protection is all intervention from public or private bodies to relieve households and individuals of the burden of a number of risks or needs, provided that it is unrequited [that is, it does not require a simultaneous equivalent counterpart from the beneficiary] and does not take place under the terms of individual arrangements".

This definition excludes from social protection all insurance policies taken out privately by individuals or households, and any expenditures by employers on behalf of their employees which can be regarded as compensation for work carried out during the reference period. It includes instead payments from insurance schemes established by laws, regulations or collective agreements, retirement and survivors' pensions paid by employers, and the continued payment of wages and salaries to employees who are absent from work because of sickness, maternity, disability, etc.

The covered risks or needs are classified by the 1981 ESSPROS methodology into eleven categories or "functions", namely Sickness; Invalidity/disability; Occupational accidents and diseases; Old age; Survivors; Maternity; Family; Placement, vocational guidance and resettlement; Unemployment; Housing; and Miscellaneous. For a more detailed description of the data, see the Appendix.

The remainder of this paper is organized as follows. Section 2 presents a summary of the level and trend of total expenditure on social protection. Section 3 examines the structure of expenditure and expenditure growth by function. Section 4 presents estimates obtained by fitting two alternative fixed-effects models. Finally, section 5 contains some conclusions.

2 Population, GDP and social protection expenditure

Table 1 presents total per-capita expenditure, per-capita GDP, and the ratio of total expenditure to GDP in the fifteen countries of the EU at the end of the period considered. Following Pestieau (1997), we interpret the ratio of total expenditure to GDP as a measure of the generosity of a social protection system.

Some remarks on the data are in order. Total expenditure is a shorthand for total current expenditure (the sum of public and private expenditures), excluding capital transactions and fiscal expenditures but gross of any taxes and Social Security contributions levied on benefits. To ensure comparability across countries, both expenditure and GDP are expressed in purchasing power units specific to private consumption (PPSC) and constant 1994 prices. To reduce the impact of business cycle effects, wherever possible we report averages over the period 1992–94. For Germany, the data refer to the boundaries after reunification (October 1991) and therefore also contain the new *Länder*. For the UK the data are only for the period 1992–93, for Austria and Finland only for 1994, whereas for Sweden expenditure data are not available.

The table indicates not only a positive relationship between per-capita GDP and per-capita expenditure (with a correlation coefficient equal to 0.951), but also between per-capita GDP and the ratio of expenditure to GDP (with a correlation coefficient equal to 0.711). Since expenditure tends to increase more than proportionally with GDP per-capita, social protection appears to be not just a "normal good" but rather a "luxury".

This conclusion does not change if, instead of comparing the various countries of the EU at the same point in time, we compare their behavior during the period 1980–94. Such a comparison can only be made for twelve countries, with Austria, Finland and Sweden excluded. The German data now refer to the boundaries prior to October 1991 and exclude the new *Länder*.

Figure 1 shows on logarithmic scale the indices (1980 = 100) of real per-capita GDP and real per-capita expenditure (in national currency) during the period considered. Not only both variables grow over time, albeit at different rates across countries, but in most cases per-capita expenditure tends to grow more rapidly than per-capita GDP. The difference between the two series is especially noticeable in Italy, where per-capita expenditure increased by 79 percent during the period, whereas per-capita GDP increased by only 37 percent, that is by less than half.

Table 2 presents the average annual growth rates of population, real GDP and real social protection expenditure during the period 1980–94. Average growth rates have been computed as the slopes of the linear time trend that best fits, in the least squares sense, the time behavior of the natural logarithm of the variables considered. More precisely, if Y_t denotes the value in year t

of the variable considered, we estimated the model $E[\ln Y_t] = \alpha + \beta t$, where E is the expectation operator and $\beta = E[\ln(Y_{t+1}/Y_t)]$ is our definition of average growth rate.

The average growth rates of per-capita expenditure and per-capita GDP are positively correlated, with a correlation coefficient of 0.556. Further, with some exceptions (Belgium, Germany, Ireland, and Luxembourg), expenditure growth exceeds the one of GDP, often by far. Southern European countries (Greece, Italy, Portugal, and Spain) are the ones where this difference is larger and therefore faster is the growth of the ratio of social protection expenditure to GDP.

Figure 2 reveals the existence of a negative relationship between the level of such ratio in 1980 and its subsequent variation. In fact, with the important exception of Ireland, the ratio of expenditure to GDP increased more in those countries where it was initially lowest (indeed, the Southern European ones), while it increased less or even declined in those countries where it was initially highest (Belgium, Germany, Luxembourg, Netherlands). Consequently, we observe a substantial reduction of its degree of dispersion across countries, as measured by the coefficient of variation, which fell from 29.4 percent in 1980 to 20.3 percent in 1994 as a result of both the increase in the average value of the expenditure to GDP ratio and the decline in its standard deviation.

Comparing Figure 2 and Table 1 shows that the reduction of the differences across the EU countries occurred without major changes in their ranking in terms of expenditure to GDP ratio, which still sees Denmark and Netherlands at the top, with expenditure representing over a third of GDP, Portugal and Greece at the bottom with less than 20 percent, and the other countries in an intermediate position with ratios between 20 and 30 percent of GDP.

Turning to year-by-year variations, a careful examination of Figure 1 reveals the existence of three groups of countries. In the first group (Denmark, Ireland, UK), per-capita expenditure presents a markedly cyclical behavior that is negatively correlated with per-capita GDP. In the second group (Germany, Greece, Portugal, Spain), expenditure is also markedly cyclical but the correlation with per-capita GDP is now positive. Finally, in the third group (Belgium, France, Italy, Luxembourg, Netherlands), expenditure shows little correlation with the cyclical movements of output.

3 Expenditure by function

The 1981 ESSPROS methodology breaks down total expenditure into benefit expenditure (the sum of cash payments and in-kind benefits), administration costs, and a residual category (Other current expenditure). Benefit expenditure is further broken down into eleven components or "functions" according to the covered risks or needs, namely Sickness; Invalidity/disability; Occupational

accidents and diseases; Old age; Survivors; Maternity; Family; Placement, vocational guidance and resettlement; Unemployment; Housing; and Miscellaneous.

The available evidence shows a certain degree of substitutability between alternative social protection programs. In many countries, for example, old age insurance and disability insurance are regarded as substitutes by people who want to retire early [see e.g. the country-specific studies in Gruber and Wise (1998)]. This substitutability has two implications. First, it tends to weaken the link between expenditure and specific risks or needs, making the ESSPROS classification somewhat arbitrary. Second, it suggests concentrating attention on broadly defined functions.

Partly for this reason, and partly to simplify the presentation, the eleven ESSPROS functions have been reduced here to seven, by merging Invalidity/disability with Occupational accidents and diseases, Old age with Survivors, Placement with Unemployment, and Maternity with Family. In addition to total current expenditure and total benefits, we also consider an intermediate aggregate consisting of Old age/survivors and Disability (OASD).

3.1 Relative importance of each function

In all countries, benefits represent the bulk of total expenditure, ranging from a minimum of 94.5 percent of total expenditure in Greece to a maximum of 97.3 percent in Denmark and Finland. We also observe a concentration of benefit expenditure in five of the seven functions considered, namely Sickness, Disability (the sum of Invalidity/disability and Occupational accidents and diseases), Old age/survivors, Family/maternity, and Employment (the sum of Placement and Unemployment), which together represent between 90 and 95 percent of total expenditure. The data in the next three tables refer to these five functions plus total benefits. Table 3 shows average per-capita expenditure during the period 1992–94 (in PPSC at constant 1994 prices), Table 4 shows the share of each function on total expenditure, whereas Table 5 shows their expenditure to GDP ratio.

As a general rule, Old age/survivors is the most important function of social protection, representing on average 42.1 percent of total expenditure and 10.7 percent of GDP, followed by the Sickness function which represents on average 22.8 percent of total expenditure and 5.9 percent of GDP. These two functions, both of which are strongly related to age, add up on average to about two thirds of total expenditure.

The only exceptions to the above rule are Ireland, where the Sickness function comes first followed by Old age/survivors, and the Netherlands, where expenditure on the Disability function marginally exceeds the one on Sickness.

The Old age/survivors function is particularly important in Italy, where it represents nearly 61 percent of total expenditure and 15.4 percent of GDP. The share on total expenditure is only

higher in Greece (63.4 percent) where, however, the incidence on GDP is much lower (9.9 percent). The Italian peculiarity is partly due to the questionable inclusion in the Old age function of a kind of severance payment, called TFR ("Trattamento di fine rapporto"), which can be paid at any age after termination of an employment spell in the private sector. In 1993, TFR represented 11.5 percent of expenditure on Old age and 9.46 percent of expenditure on Old age/survivors. The same year, without TFR, the Italian share of Old age/survivors on total expenditure would fall from 60.3 to 54.5 percent, and its ratio to GDP would fall by 1.5 percentage points from 15.5 to 14.0 percent.

Finding other patterns in the data is not easy. For example, the Disability function ranks second in terms of expenditure in the Netherlands, third in Belgium, Germany, Greece, Italy, Luxembourg, Portugal and the UK, but only fourth in Spain and fifth in Denmark and France. In Denmark, Ireland and Spain, the third position is taken instead by the Employment function, which only comes fifth in Italy, Luxembourg and the UK, whereas in France it is taken by the Family/maternity function, which only comes fifth in Belgium, Germany, Greece, Netherlands, Portugal and Spain.

3.2 Relationship with per-capita GDP

Figure 3 shows the scatterplots of per-capita GDP and per-capita expenditure by function. Data are averages for the period 1992–94 and are expressed in PPSC at constant 1994 prices. To represent more clearly the relative position of the various countries, each variable is represented in percentage of the unweighted average of the EU countries. As a visual aid, each graph also shows the fitted regression line.

The cross-sectional relationship between per-capita GDP and per-capita expenditure is positive for all functions, and appears to be particularly strong for Sickness, Old age/survivors, and Family/maternity. One indicator of the strength of such relationship is the coefficient of multiple correlation (R^2), which measures what fraction of the total variance of per-capita expenditure is accounted for by the cross-country variability of per-capita GDP. Such coefficient is highest for the Old age/survivors function ($R^2 = 0.802$), followed by the functions Sickness ($R^2 = 0.747$) and Family/maternity ($R^2 = 0.700$). It is lower for the Disability function ($R^2 = 0.453$) and loses statistical significance for the functions Employment, Housing and Miscellaneous.

Figure 4 shows instead the scatterplots of per-capita GDP and the ratio of expenditure to GDP by function. The cross-sectional relationship is now positive for all functions except Employment and Miscellaneous, but is statistically significant only for three of them, namely Family/maternity ($R^2 = 0.406$), Old age/survivors and Sickness ($R^2 = 0.275$ for both).

3.3 Time trends during the period 1980–94

Table 6 presents the average annual growth rates of per-capita expenditures on the five main functions of social protection during the period 1980–94. Growth rates are computed for real per-capita expenditure in national currency. Data for Germany include only the Western *Länder*.

In most countries, per-capita expenditure grew in real terms for all functions considered. Family/maternity is the sole function for which per-capita expenditure fell in some countries, most notably Greece and Spain. In half of the countries (France, Germany, Greece, Ireland, Portugal, and Spain), the Employment function represents the most dynamic component of expenditure, usually followed by the functions Old age/survivors or Sickness. In the other six countries, the most dynamic components are the functions Sickness (Belgium), Old age/survivors (Italy and Netherlands), Family/maternity (Denmark and Luxembourg), and Disability (UK).

Comparing Tables 2 and 6 shows that, for the functions Sickness, Disability, Old age/survivors and Employment, per-capita expenditure grew less than per-capita GDP only in a minority of countries. Thus, for example, the Old age/survivors function behaves like a luxury in all countries except Belgium, Germany, Ireland and Luxembourg, whereas the Employment function behaves like a luxury in all countries except Belgium, Italy, Luxembourg, Netherlands and the UK.

Figure 5 presents the scatterplots of the average growth rates of per-capita GDP and per-capita expenditure by function. The correlation between the growth rates of per-capita expenditure and per-capita GDP is positive for all functions except the residual category (Miscellaneous). Notice that, in all Southern European countries, the growth rates of expenditure on the functions Sickness, Disability and Old age/survivors are not only higher than GDP growth rates, but always exceed what one would predict on the basis of per-capita GDP growth.

Figure 6 looks at the issue of convergence in the structure of social protection expenditure across the EU countries by plotting, for each function, the ratio of expenditure to GDP in 1980 to its subsequent variation. There is clear evidence of convergence for some functions, most notably Sickness, Disability and Old-age/survivors, but little evidence of convergence for the others. For the function Sickness, the coefficient of variation of the ratio of expenditure to GDP fell from 34.2 percent at the beginning of the period to 23.6 percent at the end, for the function Disability it fell from 59.4 to 47.4 percent, whereas for the function Old age/survivors it fell from 27.3 to 23.3 percent. On the other hand, the coefficient of variation rose from 46.8 to 59.8 percent for the Family/maternity function, and from 123.5 to 137 for the Housing function.

3.4 Sources of variability of per-capita expenditure

In addition to a considerable degree of cross-country variability at any point in time (between-country component), expenditure on each function of social protection also displays a certain amount of variability over time for the same country (within-country component). It is therefore interesting to ask how much of the total variability may be attributed to these two different sources.

An answer is provided by Table 7 which shows, for each function, the standard deviation and the coefficient of variation of real per-capita expenditure, and the contribution of between- and within-country components to the total variance. For each function, the main contribution to total variability always comes from the between-country component. This generally represents over 85 percent of the total variance of per-capita expenditure (compared with 75 percent in the case of per-capita GDP), whereas a much smaller role is played by the variability within countries.

It is interesting to notice that, although expenditure variability (as measured by the standard deviation) increases with the average size of a function, the degree of variability (as measured by the coefficient of variation) is largest for the functions of smaller size (Housing and Miscellaneous) and smallest for those of larger size (Sickness and Old age/survivors).

4 Statistical models of expenditure

The differences across the EU in the level, composition and time behavior of social protection expenditure may be attributed only partly to the differences in income levels. It is quite reasonable to suppose that other factors – demographic, economic and institutional – may also matter. For example, just looking at the target population of many social protection programs suggests that an important role may be played by the age structure of the population and the labor market conditions. Both vary considerably across the EU countries, and this heterogeneity may help explain the observed patterns of expenditure.

Testable implications for social protection expenditure also come from the political economy models of the type surveyed by Persson and Tabellini (1998). According to these models, shifts in the age structure of the population imply that the decisive voter gets older. As a result, age-related transfers (e.g. per-capita expenditures on the functions Old-age and Sickness) are predicted to increase with the relative importance of the elderly. This is consistent with the empirical evidence in Lindert (1996), Perotti (1996), and Tabellini (1992) who show that, in panels of developed countries and in cross-sectional correlations of larger country groups, pension expenditures as a fraction of GDP is larger the greater is the share of elderly in the population. This evidence is not

entirely convincing, however, due to failure to control for other observable country characteristics.

Our goal in this section is to provide measures of cross-country differences in expenditure that allow for the role played by differences in the level of income, the demographic structure and the characteristics of the labor market. Unfortunately, ESSPROS does not contain information on prices and so we are unable to control for the effects of relative price changes on expenditure.

Lacking comprehensive measures of the age structure of the population and the characteristics of the labor market, we decided to focus on two groups of indicators. The first group, relative to the demographic structure, consists of the youth dependency ratio, defined as the ratio of people aged less than 20 years to the population of working age (conventionally defined as the population in the 20–59 age bracket), and the elderly dependency ratio, defined as the ratio of people aged 60 and older to the population of working age. The second group of indicators, relative to the labor market, consists of male and female labor force participation rates and unemployment rates among the population of working age.

4.1 The basic models

Our tools for summarizing the evidence contained in the data are the following linear fixed-effects models, respectively for the level of per-capita expenditure

$$Y_{ijt} = \alpha_{ij} + \beta_j X_{it} + \gamma_j W_{it} + U_{ijt}, \tag{1}$$

and the ratio of expenditure to GDP

$$\frac{Y_{ijt}}{X_{it}} = \alpha_{ij} + \beta_j \log X_{it} + \gamma_j W_{it} + U_{ijt}, \tag{2}$$

where i refers to the country, j to the expenditure category and t to the year, Y_{ijt} is real per-capita expenditure, X_{it} is real per-capita GDP, W_{it} is a vector of additional covariates whose values vary both across countries and over time but not across expenditure categories, α_{ij} is a time-invariant country-specific "fixed effect", U_{ijt} is an unobservable zero-mean random error, and (β_j, γ_j) is a (row) vector of parameters to be estimated. Because the two models are not equivalent, comparing their results offers a simple way of checking the robustness to functional form of the conclusions that we draw from the data.

Both expenditure and GDP are measured in PPSC at constant 1994 prices. The vector W_{it} includes the youth and elderly dependency ratios (denoted in what follows by DR_Y and DR_O), female and male labor force participation rates (denoted by LFPR_F and LFPR_M), and female and male unemployment rates (denoted by UR_F and UR_M). These variables are all in percentage terms and have been computed using the frequencies by age and sex tabulated from the Community Labor

Force Survey for the period 1983–94, suitably reweighted in order to allow for sampling design [see the Appendix for further details]. To facilitate the interpretation of the model parameters, all covariates are expressed as deviations from the their overall mean.

Qualitatively, the behavior of the covariates is rather similar across countries. Over the period considered we observe an increase in real per-capita GDP, a fall in youth dependency ratios, and a rise in elderly dependency ratios. We also observe labor force participation increasing for females and declining for males. Finally, both male and female unemployment rates show a strong cyclical behavior about a trend that is upward sloping in most countries.

The assumed models decompose the difference in the left-hand side variable between two countries in the same year into three components. The first component, represented by $\beta_j(X_{it} - X_{ht}) + \gamma_j(W_{it} - W_{ht})$, captures the effect of differences between the two countries in the values of the covariates (per-capita GDP, dependency ratios, labor force participation and unemployment rates). The second component, represented by $\alpha_{ij} - \alpha_{hj}$, captures the presence of time-invariant unobserved heterogeneity, that is, the presence of systematic differences that cannot simply be attributed to differences in the values of the covariates. This component reflects cross-country differences in tastes, institutional arrangements, etc. The third component, represented by $U_{ijt} - U_{hjt}$, captures instead other non systematic differences between the two countries.

They also decompose the difference between two different years for the same country into two components. The first component, represented by $\beta_j(X_{it} - X_{is}) + \gamma_j(W_{it} - W_{is})$, captures the effect of differences in the values of the covariates between the two years. The second component, represented by $U_{ijt} - U_{ijs}$, captures instead other non systematic differences between the two years.

Both (1) and (2) are related to models routinely used in demand analysis. Model (1) corresponds to the Engel curves of the Linear Expenditure System, whereas (2) corresponds to the so-called Working-Leser class of Engel curves [see Deaton and Muellbauer (1980)]. Since both models are fully consistent with utility maximization, the estimated parameters may be interpreted as describing the preferences of a central planner that solves the problem of allocating per-capita GDP between the various functions of social protection and the aggregate of all other uses. Under this interpretation, the term $\alpha_{ij} + \gamma_j W_{it}$ in (1) may be related to the "committed expenditure" on each function, which is assumed to depend on the country fixed-effects, the population age structure, and the labor market conditions.

The two models have been estimated by least squares, separately for each function of social protection and three aggregates, namely expenditure on Old age/survivors and Disability (OASD), total benefits, and total expenditure. The estimation period is 1983–94. The estimated coefficients and the associated observed significance levels are presented in tables 8–11. Notice that, by linearity

of both models and the properties of least squares, the coefficients on the aggregates of functions (such as OASD and total benefits) are equal to the sum of the coefficients on the component functions. Also notice that inference hardly changes if, instead of the classical estimates of precision, we use instead estimates that are consistent under heteroskedasticity of unknown form.

4.2 Estimates of the level equation

The coefficients in the column labeled GDP measure the expected change in per-capita expenditure associated with a unit increase in per-capita GDP, keeping all other variables constant. Except for the functions Employment, Housing and Miscellaneous, such coefficients turn out to be positive and highly statistically significant, thus confirming the nature of "normal goods" of the main functions of social protection. The largest coefficients are for the Old age/survivors function, followed by the functions Sickness and Family/maternity.

The coefficients in the columns labeled DR_Y and DR_O measure the expected changes in per-capita expenditure associated with a one-percentage-point increase in dependency ratios. The coefficients on the youth dependency ratio are negative for all functions except Sickness, and are statistically significant for total benefit and the functions Disability, Employment, Housing and Miscellaneous. Somewhat surprising, an increase in the youth dependency ratio seems to have a sizeable negative effect on expenditure on Employment. The coefficients on the elderly dependency ratio turn out to be positive and statistically significant only for the Sickness function, but negative or not statistically significant for all the other functions and for total expenditure. In particular, the estimated coefficients for the Old age/survivors function do have the expected sign (negative for DR_Y and positive for DR_O) but are not statistically significant.

The coefficients in the columns labelled LFPR_F and LFPR_M measure the expected variations of per-capita expenditure associated with a one-percentage-point increase in labor force participation rates. The coefficients on female labor participation are positive and statistically significant for the Sickness function, negative and statistically significant for the functions Family/maternity and Miscellaneous, and not significantly different from zero for the remaining functions. On the other hand, the coefficients on male labor force participation are statistically significant only for the functions Disability and Family/maternity. Notice that the sign of the latter coefficient is positive, implying an increase in per-capita expenditure. Positive is also the net effect on expenditure for Family/maternity of a one-percentage-point increase in both male and female participation rates.

Finally, the coefficients in the columns labeled UR_F and UR_M measure the expected variations of per-capita expenditure associated with a one-percentage-point increase in unemployment rates. The coefficients on the female unemployment rate are statistically significant only for the Sickness

function. The coefficients on the male unemployment rate are instead all positive and are generally sizeable and highly statistically significant. The only exceptions are the functions Disability and Miscellaneous, whose coefficient are not statistically significant. Thus, keeping all other variables constant, an increase in female unemployment rates appears to have no appreciable influence on per-capita expenditure, whereas an increase in male unemployment rates is associated with increased expenditure on most functions, and in particular on the functions Sickness, Employment and Old age/survivors.

4.3 Estimates of the share equation

Under model (2), the coefficients on log per-capita GDP measure the expected change in the ratio of expenditure to GDP associated with a one-percent increase in per-capita GDP, keeping all other variables constant. Except for the Family/maternity function, whose coefficient is positive and statistically significant, these coefficients are now negative or not statistically significant. Thus, except for the Family/maternity function, data lend no support to the hypothesis that, *coeteris paribus*, social protection expenditure increases more than proportionally with GDP. In other words, after taking into account differences in the age structure of the population and the labor market conditions, the Family/maternity function seems to be the only one having the nature of a "luxury good".

We find instead further evidence that, all other things being equal and with the exception of the Sickness function, increases in the dependency ratios (both the youth and the elderly ones) seem to have no expansionary effects on expenditure. Particularly sizeable appears to be the negative effects of higher youth dependency ratios on expenditure on Old age/survivors and of higher elderly dependency ratios on expenditure on Disability.

The coefficients on the labor force participation rates are statistically significant only in some cases. In particular, they are both statistically significant in the Family/maternity case, again with opposite signs for the female and male rates (respectively, negative and positive).

Finally, the coefficients on female unemployment are usually not very important quantitatively and not very significant statistically, whereas those on male unemployment are always positive and generally sizeable and highly significant. This holds, in particular, for the functions Sickness, Old age/survivors, and Employment. It appears, therefore, that the increase in both the level of per-capita expenditure and the ratio of expenditure to GDP between 1983 and 1994 is related to the rise of male unemployment rates, although it remains an open problem to determine the causal direction of this relationship.

4.4 Estimated fixed-effects

Tables 10 and 11 present estimates of the country-specific fixed-effects in the case of total benefits and the five main functions of social protection. Specifically, the tables present the deviations $\mu_{ij} = \alpha_{ij} - \bar{\alpha}_j$ of each country from the European average $\bar{\alpha}_j$ shown in the row labelled EU12. These deviations measure how much of the difference with respect to the EU average is left unexplained after taking into account the differences in per-capita GDP, dependency ratios, labor force participation rates and unemployment rates, and are therefore a measure of the "peculiarity" of each country.

Looking at total benefits, Denmark and the Netherlands show the largest positive deviations from the EU average, whereas Greece, Spain and Portugal show the largest negative ones. Excess expenditure in the Netherlands mostly reflects the high level of expenditure on the functions Sickness and Disability, whereas in Denmark it is entirely due to the functions Family/maternity and Employment. On the other side, the expenditure gap in Greece reflects low levels of expenditure on the functions Sickness and Employment, in Portugal it reflects low levels of expenditure on the functions Sickness and Old age/survivors, whereas in Spain it reflects low levels of expenditure on the functions Old age/survivors and Family/maternity.

Italy is another interesting outlier, not as much for its level of expenditure, but rather for its composition. If we take into account its per-capita GDP and the value of the other covariates in our model, Italy is well above the European average with respect to the Old age/survivors function, with levels of per-capita expenditure and an expenditure share on GDP that are by far the highest in Europe. Even if we exclude TFR from expenditure on Old age/survivors, the ratio of expenditure to GDP is still 2.2 (= 3.7 - 1.5) percentage points above the EU average [see Section 3.1]. Italy is instead below the European average in terms of total benefits and all the other functions considered except Sickness.

5 Conclusions

Among the aspects that are common to all EU countries are the increase in life expectancy at all ages, the rise in the share of the elderly on total population, the decline of male labor force participation rates partly offset by the increase of female ones, and the sharp increase of youth unemployment rates. Southern European countries are also characterized by total fertility rates that are well below what would be necessary in order to keep the population stable in the absence of substantial migration flows.

Along with differences in the level and growth of per-capita income, some of these phenomena

help explain the observed patterns of social protection expenditure in the countries of the EU. In particular, our results show that a significant fraction of the increase in the ratio of social protection expenditure to GDP is related to the increase in male unemployment rates during the period considered. It remains an open problem, however, to determine the causal direction of this relationship.

Another result is that, although a substantial fraction of the cross-country variability in expenditure may be attributed to differences in income levels, the age structure of the population, and the level of labor force participation and unemployment rates, there are important differences that our statistical model is unable to capture. In particular, our model is unable to explain the relatively high level of expenditure on Employment in Denmark, on Old age/survivors in Italy, and on Disability in the Netherlands, and the relatively low level of expenditure on Sickness in Greece, on Old age/survivors in Ireland and Portugal, and on Family/maternity in Spain.

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Table 1: Total per-capita expenditure on social protection at 1994 prices, per-capita GDP at 1994 prices, and percentage ratio between total social protection expenditure and GDP. Averages 1992–94. The EU12 aggregate excludes Austria, Finland, Sweden and the new German *Länder*.

	Per-capita expenditure		Per-capita GDP		Expenditure/
	PPSC	EU12 = 100	PPSC	EU12 = 100	GDP
Austria	5611	129.8	18303	112.5	30.7
Belgium	4986	115.3	18459	113.4	27.0
Denmark	6054	140.0	18299	112.5	33.1
Finland	5144	119.0	14819	91.1	34.7
France	5405	125.0	17899	110.0	30.2
Germany	5435	125.7	17755	109.1	30.6
Greece	1599	37.0	10270	63.1	15.6
Ireland	2749	63.6	12909	79.3	21.3
Italy	4327	100.1	16972	104.3	25.5
Luxembourg	6332	146.5	25875	159.0	24.5
Netherlands	5587	129.2	17001	104.5	32.9
Portugal	2060	47.6	11011	67.7	18.7
Spain	3022	69.9	12769	78.5	23.7
Sweden			16157	99.3	
UK	4325	100.0	16035	98.5	27.0

Table 2: Annual percentual growth rates of total population, real GDP, and real social protection expenditure during the period 1980–94. The data for Germany refer to the borders before reunification.

	Population	GDP		Expenditure	
		total	per-capita	total	per-capita
Austria	0.4	2.7	2.3		
Belgium	0.2	2.3	2.2	1.5	1.3
Denmark	0.1	1.9	1.8	2.8	2.7
Finland	0.4	1.9	1.4	4.8	4.3
France	0.5	2.2	1.7	3.0	2.5
Germany	0.5	2.9	2.4	2.2	1.7
Greece	0.5	1.1	0.6	3.7	3.2
Ireland	0.2	3.6	3.3	2.9	2.7
Italy	0.0	2.8	2.7	4.4	4.3
Luxembourg	0.7	5.8	5.1	4.7	4.0
Netherlands	0.6	2.0	1.4	2.2	1.6
Portugal	0.0	3.8	3.8	6.3	6.2
Spain	0.3	3.3	3.1	5.1	4.8
Sweden	0.4	1.5	1.1		
UK	0.3	2.3	2.1	3.3	3.0

Table 3: Per-capita expenditure on the five main functions of social protection and total benefits. Averages 1992–94, in PPSC at constant 1994 prices.

	Sickness	Disability	Old age/ survivors	Family/ maternity	Employment	Total benefits
Austria						5426
Belgium	1166	499	2113	398	531	4768
Denmark	1081	552	2071	692	1057	5892
Finland						5002
France	1353	399	2236	488	413	5120
Germany	1425	605	2126	417	472	5209
Greece	205	151	1013	19	48	1511
Ireland	774	195	738	338	445	2628
Italy	916	367	2618	155	94	4151
Luxembourg	1484	886	2870	764	86	6109
Netherlands	1181	1189	1974	290	498	5340
Portugal	625	271	776	111	113	1956
Spain	755	290	1198	50	562	2899
Sweden						
UK	835	493	1719	463	310	4158

Table 4: Percentage share of the five main functions of social protection and total benefits on total expenditure. Averages 1992–94.

	Sickness	Disability	Old age/ survivors	Family/ maternity	Employment	Total benefits
Austria						96.7
Belgium	23.4	10.0	42.4	8.0	10.6	95.6
Denmark	17.9	9.1	34.2	11.4	17.5	97.3
Finland						97.3
France	25.0	7.4	41.4	9.0	7.6	94.7
Germany	26.2	11.1	39.1	7.7	8.7	95.8
Greece	12.8	9.5	63.4	1.2	3.0	94.5
Ireland	28.2	7.1	26.8	12.3	16.2	95.6
Italy	21.2	8.5	60.5	3.6	2.2	95.9
Luxembourg	23.4	14.0	45.3	12.1	1.4	96.5
Netherlands	21.1	21.3	35.3	5.2	8.9	95.6
Portugal	30.3	13.1	37.7	5.4	5.5	94.9
Spain	25.0	9.6	39.6	1.7	18.6	95.9
Sweden						
UK	19.3	11.4	39.7	10.7	7.2	96.1

Table 5: Percentage ratio to GDP of the five main functions of social protection and total benefits. Averages 1992–94.

	Sickness	Disability	Old age/ survivors	Family/ maternity	Employment	Total benefits
Austria						29.6
Belgium	6.3	2.7	11.4	2.2	2.9	25.8
Denmark	5.9	3.0	11.3	3.8	5.8	32.2
Finland						33.8
France	7.6	2.2	12.5	2.7	2.3	28.6
Germany	8.0	3.4	12.0	2.3	2.7	29.3
Greece	2.0	1.5	9.9	0.2	0.5	14.7
Ireland	6.0	1.5	5.7	2.6	3.4	20.4
Italy	5.4	2.2	15.4	0.9	0.6	24.5
Luxembourg	5.7	3.4	11.1	3.0	0.3	23.6
Netherlands	6.9	7.0	11.6	1.7	2.9	31.4
Portugal	5.7	2.5	7.1	1.0	1.0	17.8
Spain	5.9	2.3	9.4	0.4	4.4	22.7
Sweden						
UK	5.2	3.1	10.7	2.9	1.9	25.9

Table 6: Percentage annual growth rates of real per-capita expenditure on the five main functions of social protection and total benefits during the period 1980–94.

	Sickness	Disability	Old age/ survivors	Family/ maternity	Employment	Total Benefits
Belgium	2.6	-0.0	1.8	-0.9	0.0	1.3
Denmark	0.3	3.2	2.7	3.8	3.5	2.7
France	2.8	1.3	2.5	0.3	5.0	2.5
Germany	2.1	1.6	1.5	0.1	2.9	1.7
Greece	2.5	2.4	3.2	-6.6	4.6	3.1
Ireland	1.5	3.5	2.0	3.4	5.8	2.7
Italy	4.1	3.9	5.5	-1.3	0.7	4.5
Luxembourg	4.6	2.7	4.1	6.0	4.5	4.2
Netherlands	1.1	1.4	3.4	-1.8	1.3	1.5
Portugal	7.0	5.5	7.1	3.1	13.6	6.6
Spain	5.0	4.4	4.6	-2.3	5.9	4.7
UK	2.7	5.3	2.8	1.8	-1.9	3.0

Table 7: Decomposition of the variance of per-capita expenditure during the period 1980–94 into within-country and between-country variability.

	Standard deviation	Coeff. of variation	% contrib. to variance	
			within	between
Sickness	356.2	0.433	12.1	87.9
Disability	268.0	0.627	4.1	95.9
Old age/survivors	610.4	0.411	15.6	84.4
Family/maternity	182.5	0.603	9.9	90.1
Employment	227.3	0.758	10.6	89.4
Housing	57.6	1.205	20.0	80.0
Miscellaneous	66.9	0.971	13.3	86.7
OASD	805.9	0.421	12.9	87.1
Total benefits	1418.0	0.410	11.8	88.2
Total expenditure	1461.2	0.405	11.7	88.3
Per-capita GDP	3845.3	0.268	24.2	75.8

Table 8: Linear fixed-effects model for per-capita expenditure: Estimated coefficients by function (** indicates an observed significance level below 5%, * indicates an observed significance level between 5 and 10%).

	GDP	DR_Y	DR_O	$LFPR_F$	$LFPR_M$	UR_F	UR_M
Sickness	0.049 **	2.188	5.225 *	10.451 **	-1.940	-9.283 **	17.871 **
Disability	0.017 **	-3.977 **	-7.867 **	3.128 **	5.696 *	1.820	1.534
Old age/survivors	0.093 **	-2.182	3.708	3.641	-20.584 *	-3.224	21.731 **
Family/maternity	0.040 **	-2.794	-6.341 **	-6.374 **	15.783 **	0.094	9.932 **
Employment	-0.000	-6.147 **	-9.702 **	0.569	-10.124	4.063	19.596 **
Housing	0.002	-1.957 **	-3.311 **	-0.308	1.309	-0.144	3.139 **
Miscellaneous	0.002	-4.215 **	-0.804	-3.420 **	-0.250	0.796	1.263
OASD	0.110 **	-6.159	-4.160	6.768	-14.888	-1.404	23.265 **
Total benefits	0.202 **	-19.085 **	-19.095	7.688	-10.124	-5.875	75.065 **
Total expenditure	0.199 **	-19.442 **	-21.325 *	10.379	-14.363	-5.704	74.030 **

Table 9: Linear fixed-effects model for the ratio of expenditure to GDP: Estimated coefficients by function (** indicates an observed significance level below 5%, * indicates an observed significance level between 5 and 10%).

	GDP	DR_Y	DR_O	$LFPR_F$	$LFPR_M$	UR_F	UR_M
Sickness	-1.305 **	-0.029	0.045 **	0.048 **	0.032	-0.061 **	0.112 **
Disability	-1.849 **	-0.046 **	-0.062 **	0.011	0.002	0.021	0.000
Old age/survivors	-3.949 **	-0.091 **	-0.017	0.047	-0.106	-0.035	0.115 **
Family/maternity	0.844 **	-0.017 *	-0.033 **	-0.025 **	0.085 **	-0.003	0.060 **
Employment	-0.622	-0.032 *	-0.040 *	-0.009	-0.018	0.036	0.137 **
Housing	0.029	-0.005	-0.011 *	0.000	0.017	-0.007	0.028 **
Miscellaneous	0.172	-0.022 **	0.011	-0.024 **	0.002	0.006	0.009
OASD	-5.798 **	-0.137 **	-0.080 *	0.057	-0.104	-0.015	0.115 *
Total benefits	-6.679 **	-0.242 **	-0.108	0.047	0.013	-0.044	0.461 **
Total expenditure	-8.217 **	-0.252 **	-0.133 *	0.065	-0.018	-0.037	0.444 **

Table 10: Estimates of the country- and function-specific fixed effects in a linear fixed-effect model for per-capita expenditure by function.

	Sickness	Disability	Old age/ survivors	Family/ maternity	Employment	OASD	Total benefits
Belgium	125.8	51.9	138.0	88.1	160.9	189.9	474.0
Denmark	-212.6	-102.3	-37.1	293.1	492.6	-139.4	690.4
France	143.1	-127.1	259.7	144.0	-7.4	132.6	497.1
Germany	342.9	45.8	157.0	-41.0	-7.9	202.7	472.8
Greece	-320.7	-126.5	-52.1	-109.6	-189.8	-178.6	-862.2
Ireland	-19.2	-135.8	-555.9	10.8	6.3	-691.7	-609.7
Italy	74.5	-98.0	515.3	-194.0	-238.5	417.4	-118.4
Luxembourg	167.6	203.5	246.4	-80.8	-198.1	449.9	143.8
Netherlands	233.5	604.4	99.5	-98.8	92.7	703.9	974.8
Portugal	-216.6	-97.5	-449.4	90.1	-113.8	-547.0	-752.5
Spain	11.8	-76.6	-351.2	-239.8	1.3	-427.8	-763.8
UK	-342.4	-88.0	-153.4	88.0	-12.6	-241.5	-352.9
EU12	853.1	442.1	1570.3	305.5	316.7	2012.5	3612.9

Table 11: Estimates of the country- and function-specific fixed effects in a linear fixed-effect model for the ratio of expenditure to GDP.

	Sickness	Disability	Old age/ survivors	Family/ maternity	Employment	OASD	Total benefits
Belgium	1.0	0.3	1.4	0.7	1.1	1.7	4.0
Denmark	-1.0	-0.1	-0.5	1.6	2.9	-0.6	4.3
France	1.3	-0.4	2.1	1.0	-0.1	1.7	4.3
Germany	1.7	0.4	0.7	-0.0	-0.1	1.0	2.4
Greece	-3.7	-1.5	-0.9	-1.4	-1.6	-2.4	-9.4
Ireland	1.1	-0.9	-3.0	0.4	0.4	-3.8	-1.5
Italy	0.4	-0.7	3.7	-1.0	-1.6	3.0	-0.3
Luxembourg	0.9	1.1	1.9	0.0	-1.0	3.0	1.9
Netherlands	1.6	3.7	0.6	-0.4	0.7	4.3	6.8
Portugal	-1.6	-0.8	-5.1	-0.1	-0.8	-6.0	-8.2
Spain	0.0	-0.7	-1.7	-1.8	0.2	-2.4	-4.8
UK	-2.0	-0.1	-0.8	0.5	-0.1	-0.9	-1.6
EU12	5.6	2.9	10.3	1.9	2.1	13.2	23.6

Figure 1: Total per-capita expenditure and per-capita GDP.

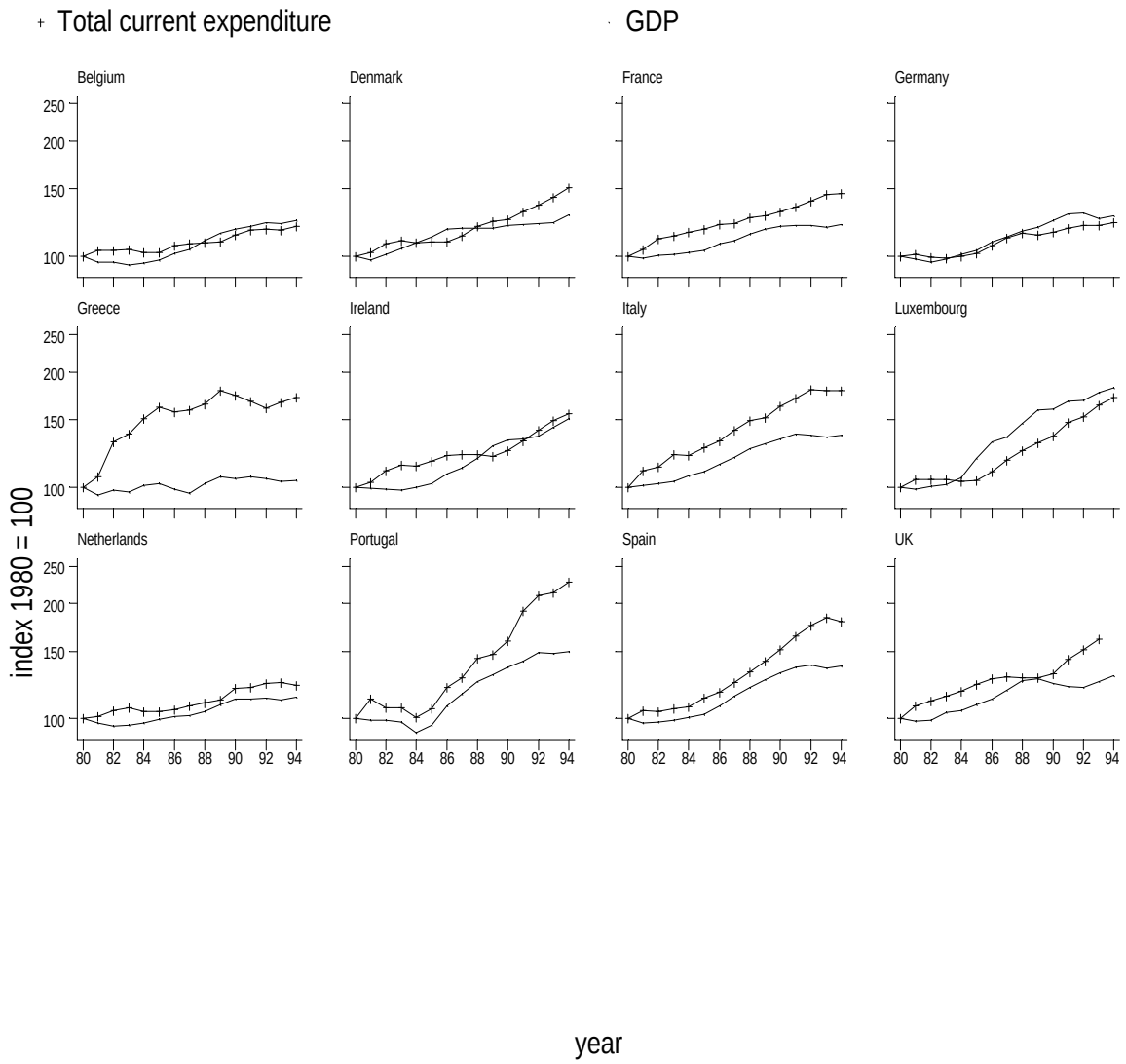


Figure 2: Total current expenditure as a percentage of GDP. The horizontal and vertical lines denote the EU average.

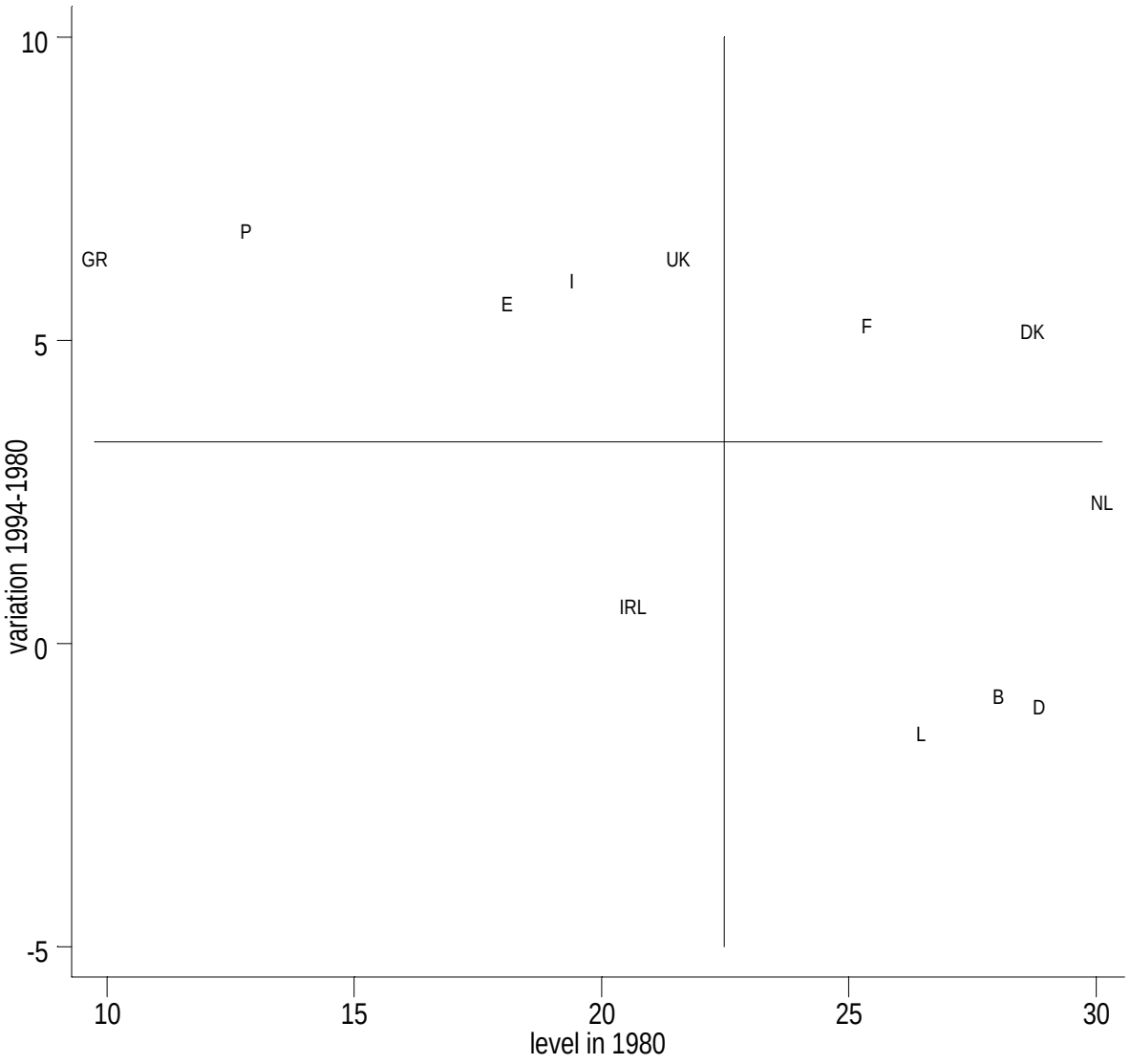


Figure 3: Per-capita expenditure by function. Average 1992–94.

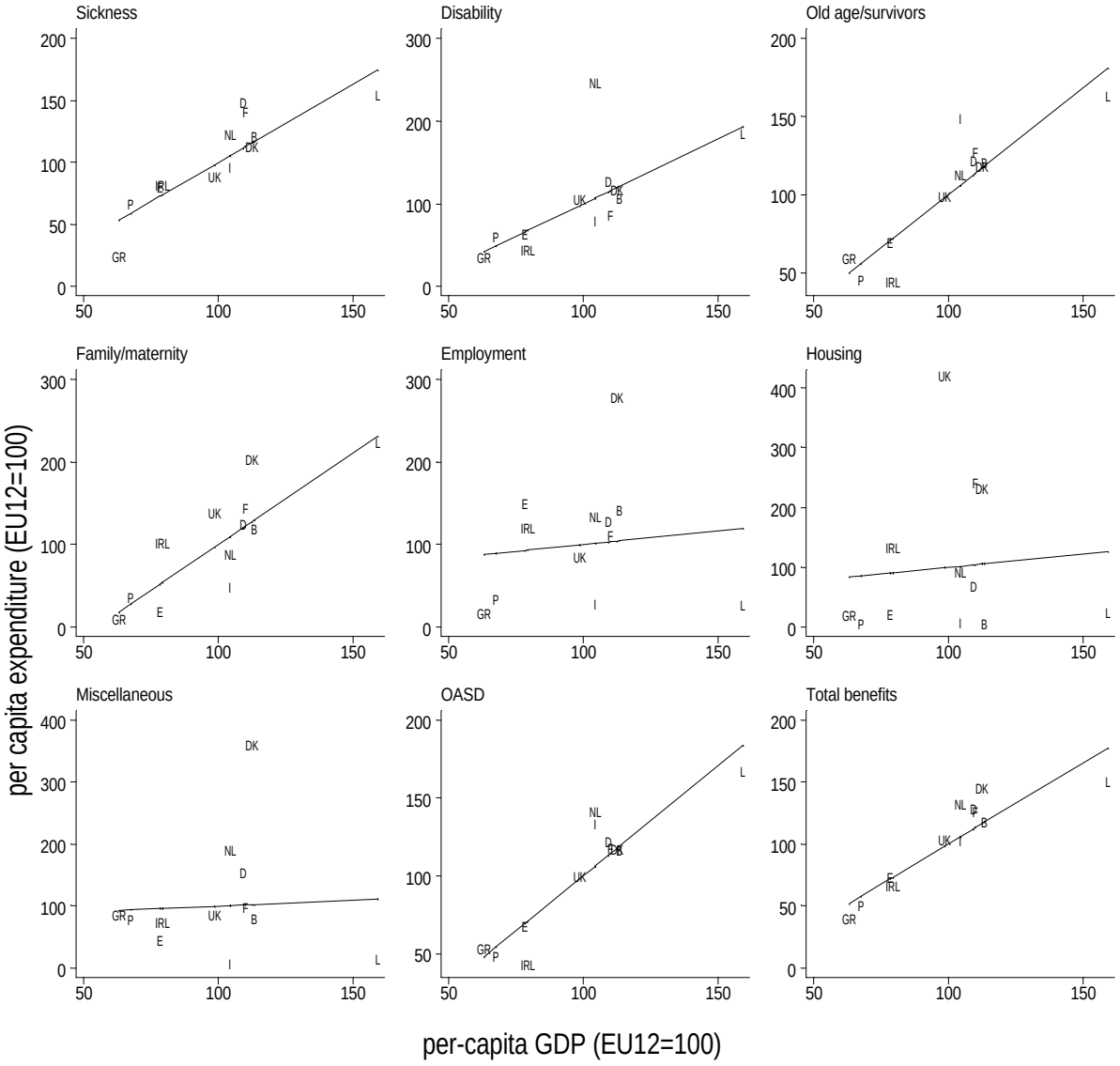


Figure 4: Expenditure by function as a fraction of GDP. Average 1992–94.

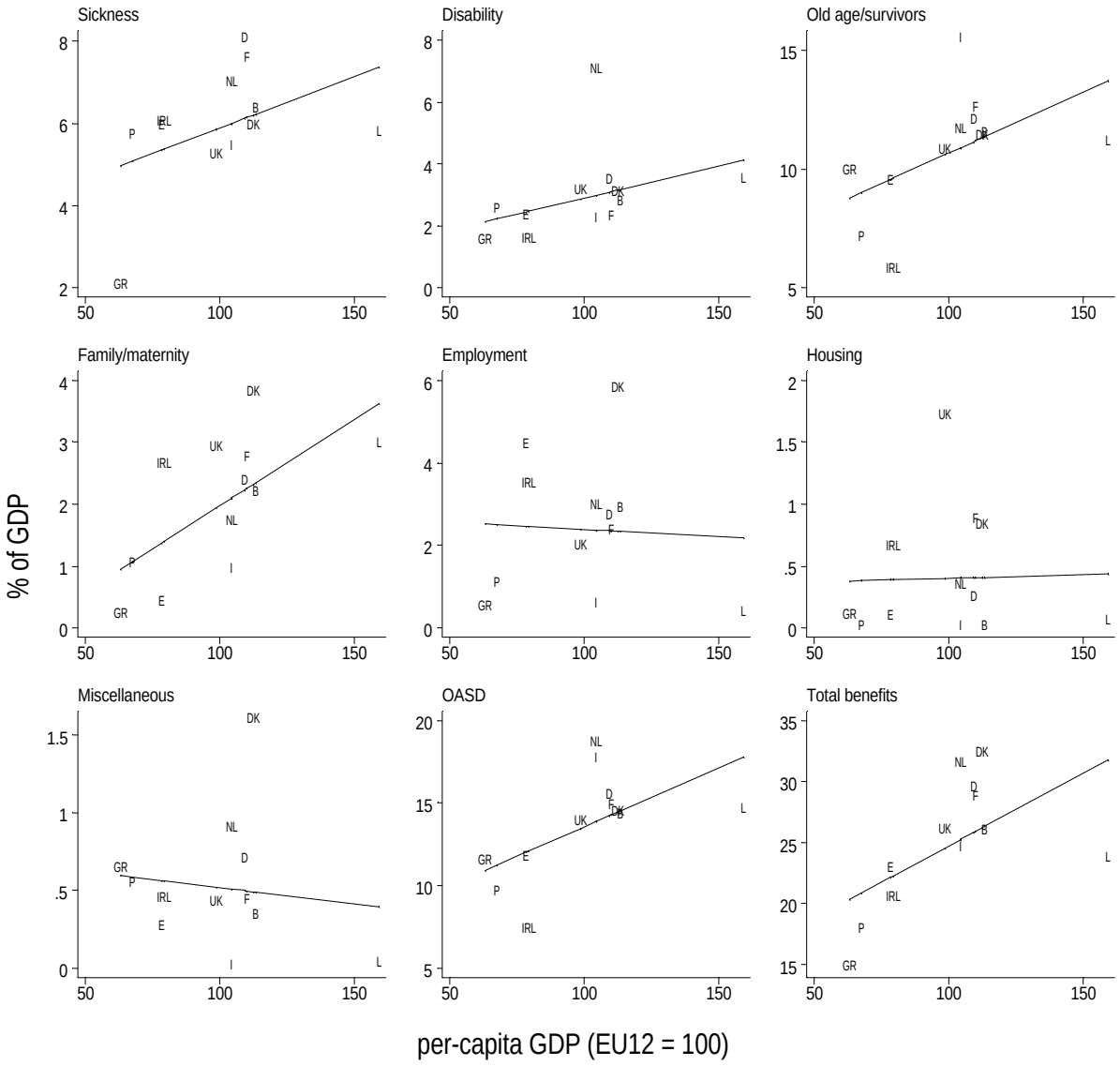


Figure 5: Annual percentage growth rate of per-capita expenditure by function, 1980–94.

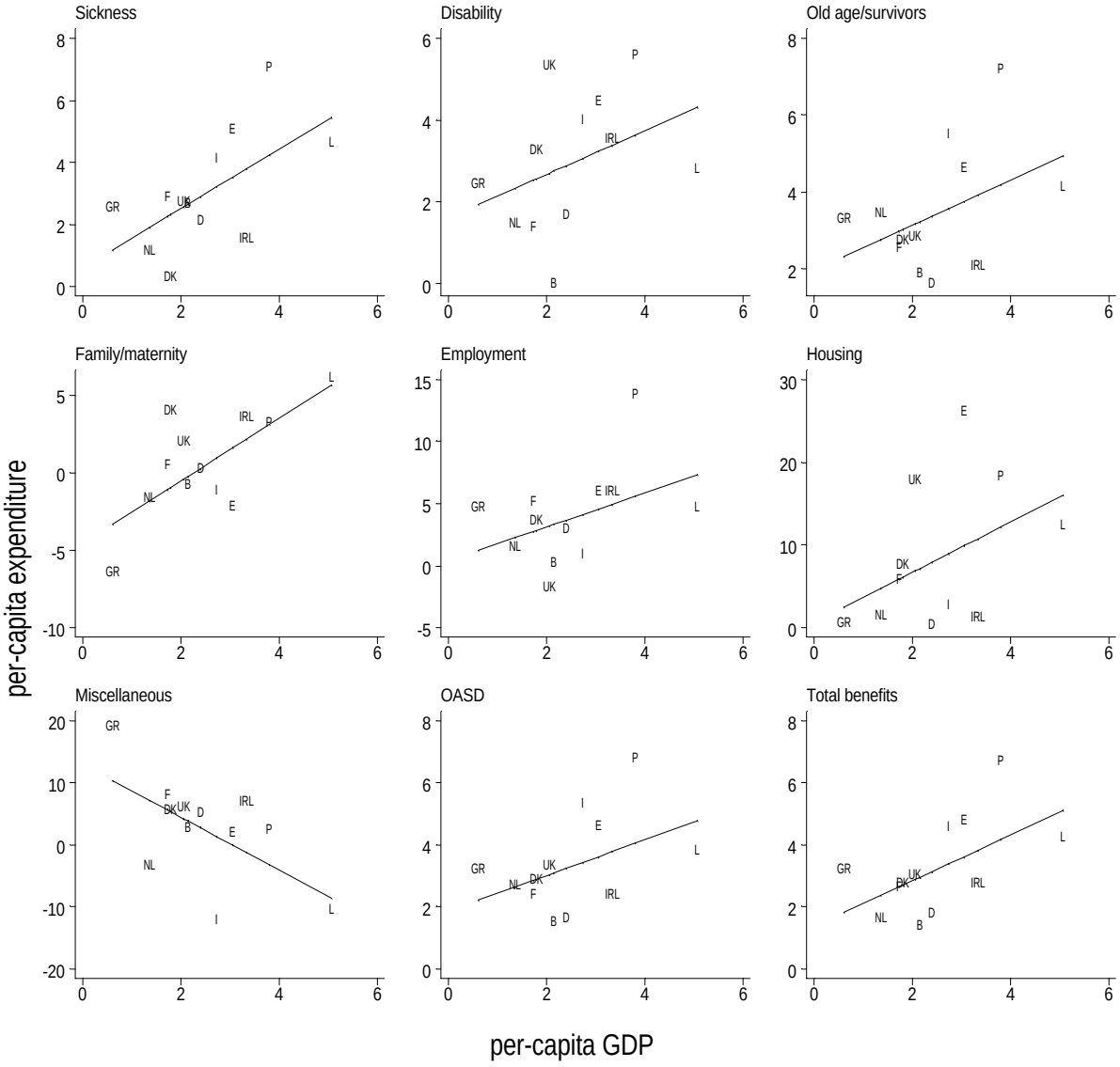
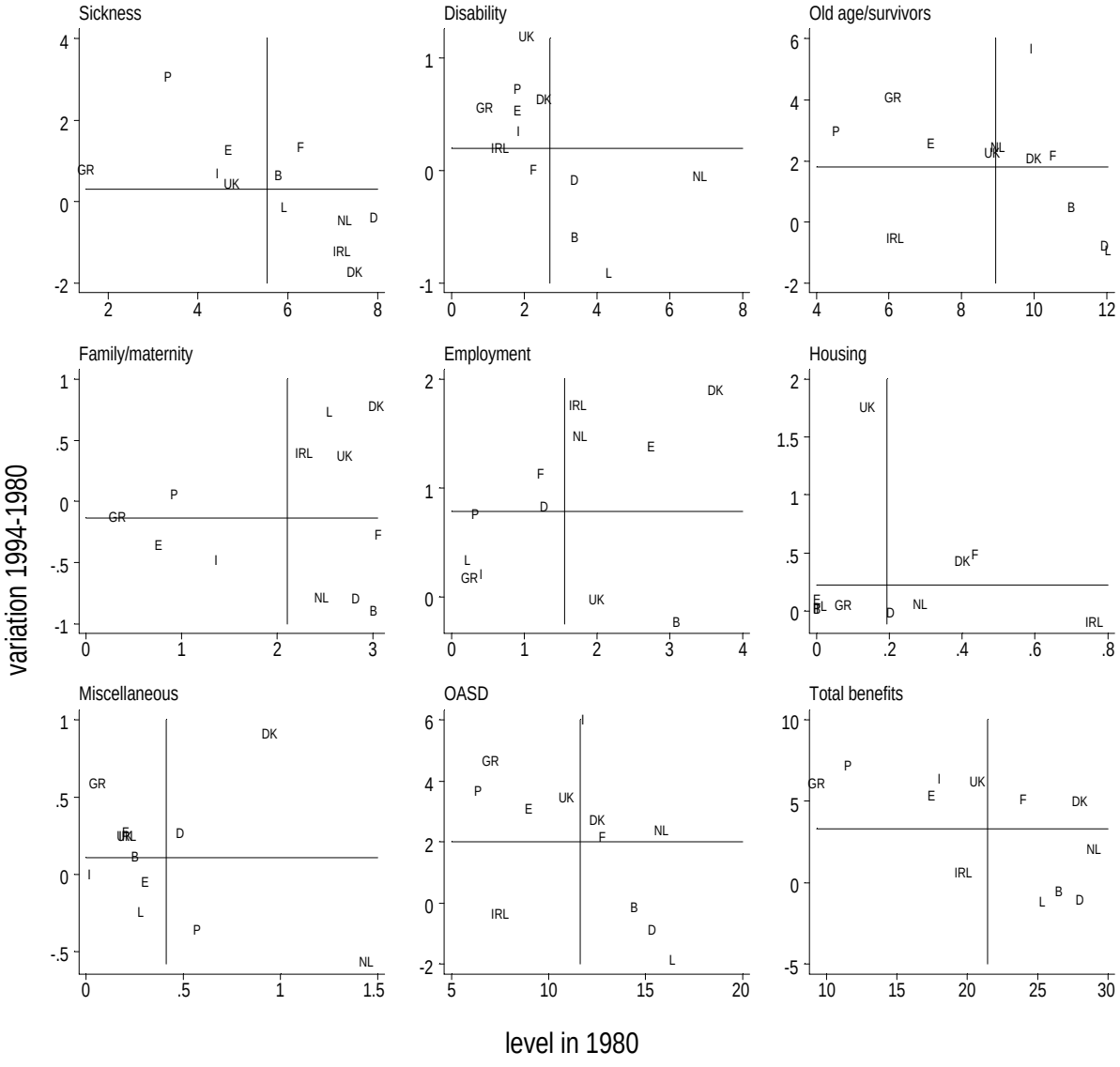


Figure 6: Expenditure by function as a percentage of GDP. The horizontal and vertical lines denote the EU average.



A Data appendix

A.1 Population, employment and unemployment

Our data are for the period 1983–94 and consist of tabulations based on the Community Labour Force Survey, a repeated cross-sectional survey carried out annually from 1983 in all countries of the EU. The questionnaire is common to all countries and the results are centrally processed by Eurostat. The survey covers the civilian population living in private households, and excludes those living in institutions or undertaking compulsory military service. The survey methodology is described in Eurostat (1988, 1992) and the main results are published in the yearbook *Labor force survey*.

A person of working age is classified as employed if, durante the reference week, he/she worked for pay for at least one hour, or did not work but had a job from which was temporarily absent. The definition of unemployed is the one adopted by the 13th International Conference of Labor Statisticians organized by the International Labour Office in 1982. According to this definition, an unemployed is a person of working age who i) does not have a job, ii) is willing to work, and iii) has been actively seeking a job in the four weeks before the survey. Among the unemployed are included those who did find a job but have not yet started working.

A.2 Social protection statistics

Our data are for the period 1980–94 and follow the 1981 ESSPROS methodology. They are published in Eurostat (1996c).

According to the definition adopted by Eurostat, social protection is all intervention from public or private bodies to relieve households and individuals of the burden of a number of risks or needs, provided that it is "unrequited", that is, it does not require a simultaneous equivalent counterpart from the beneficiary, and does not take place under the terms of individual arrangements.

This definition excludes from social protection all insurance policies taken out privately by individuals or households, and any expenditures by employers on behalf of their employees which can be regarded as compensation for work carried out during the reference period. It includes instead payments from insurance schemes established by laws, regulations or collective agreements, retirement and survivors' pensions paid by an employer, and the continued payment of wages and salaries while an employee is absent from work as a result of sickness, maternity, disability, etc. Data are only for current expenditure (excluding capital transactions and fiscal expenditures) and are gross of any taxes and Social Security contributions levied on benefits.

The 1981 ESSPROS methodology breaks down total expenditure into benefit expenditure (the

sum of cash payments and in-kind benefits), administration costs and a residual category (Other current expenditure). Benefit expenditure is further broken down into eleven components or "functions" according to the risks or needs covered by social protection programs, namely Sickness; Invalidity/disability; Occupational accidents and diseases; Old age; Survivors; Maternity; Family; Placement, vocational guidance and resettlement; Unemployment; Housing; and Miscellaneous.

In particular, the Old age function covers pensions and allowances paid in case of survival beyond a prescribed age; compensatory or additional pensions and allowances; early/retirement or redundancy benefits paid temporarily until the age of retirement is reached; benefits to compensate for loss of income paid to invalids who have passed the normal retirment age; the provision of accomodation (institutional, homes, old people's homes, etc.) and various kind of assistance for old people; other forms of social assistance for old people (various kind of reduction, other benefits in kind, etc.).

The survivors function covers instead pensions, compensation payments and other cash benefits paid out to survivors in their capacity as relatives of the deceased person; pensions reverting to next-of-kin; death grants, funeral expenses, etc.

Both functions exclude medical care (included in the Sickness function) and allowances or supplements for dependants (included in the Family function). For each of the two functions, ESSPROS distinguishes between three groups of schemes: i) basic schemes, ii) supplementary schemes (compulsory and supplementary), and iii) means-tested schemes.

With the new 1996 methodology, the number of functions of social protection has been reduced to eight and the definition of some of the functions has been modified. In particular:

1. The Sickness function now includes all medical services, irrespective of the reason for which they are provided.

2. The maternity function was deleted. Cash benefits connected to childbirth are now included in the function Family/children, while health care connected to maternity is included in the Sickness function.

3. The function Occupational accidents and diseases was deleted. Cash benefits connected to this function are now included in the function Invalidity/disability, while medical care is included in the Sickness function.

4. The function Placement, vocational guidance and resettlement (later renamed "Promotion of employment") was deleted. All employment promotion programs which imply a direct benefit to households are now included in the Unemployment function.

5. The new function Social exclusion not elsewhere classified replaces the functions Miscellaneous and General neediness. The risks covered by this function are insufficient level of income and precarious situations in terms of health, education and employment.

At the same time, the classification scheme has been made more flexible by distinguishing, for example, compulsory from voluntary schemes, contributory from non-contributory schemes, etc. The data based on the new methodology should be released early in 1998.

Per more details on the 1991 methodology see Eurostat (1981). For the new 1996 methodology see Eurostat (1996a, 1996b).

In 1992, Eurostat began publishing a series of monographs by function with detailed information on the expenditure amount and number of beneficiaries by type of benefit (*Digest of statistics on social protection in Europe*).