



**Dipartimento di Statistica**  
**"Giuseppe Parenti"**

Dipartimento di Statistica "G. Parenti" – Viale Morgagni 59 – 50134 Firenze – [www.ds.unifi.it](http://www.ds.unifi.it)

W O R K I N G P A P E R 2 0 0 8 / 0 7

Individual and Contextual  
Correlates of  
Economic Difficulties  
in Old Age in Europe

Daniele Vignoli,  
Gustavo De Santis



Università degli Studi  
di Firenze

# **INDIVIDUAL AND CONTEXTUAL CORRELATES OF ECONOMIC DIFFICULTIES IN OLD AGE IN EUROPE**

Daniele Vignoli – Gustavo De Santis

*Department of Statistics “G. Parenti”, University of Florence*

For correspondence: vignoli@ds.unifi.it – desantis@ds.unifi.it

## **Abstract**

With data drawn from the second public release version of the ‘Survey of Health, Aging and Retirement in Europe’ (SHARE), we scrutinize individual and contextual (regional) correlates of economic difficulties among older Europeans, aged 65 or more. A logistic multi-level regression model with random intercept shows that the risk of being relatively poor varies considerably among the aged. Beside the individual-level covariates, which all act in the expected direction, the risk of being in economic difficulties is also markedly influenced by contextual variables: regions with faster levels of economic development experience higher levels of poverty alleviation.

## **1 Introduction**

We use data from the second public release version of the ‘Survey of Health, Aging and Retirement in Europe’ (SHARE) to examine individual and contextual (regional) correlates of poverty among older Europeans, aged 65 or more. Among these correlates, the contextual ones, although sometimes disregarded, appear to be particularly important (e.g. Scheepers and Te Grotenhuis 2005; Dewilde 2006): we will therefore keep both dimensions, individual and contextual, under control when scrutinizing the economic well-being of the elderly. This leads, almost naturally, to a multilevel approach.

We will consider individuals nested in regions belonging to the eleven European countries covered by SHARE: Austria, Belgium, Denmark, France, Germany, Greece, Italy, the

Netherlands, Spain, Sweden, and Switzerland. SHARE data fits our need, because it covers such diverse domains as education, employment, health, housing, and demographic characteristics. Besides, respondents are geographically referenced, and may therefore be clustered, e.g. by regions. We also explicitly consider regional-level variables (stemming from Eurostat data) and regional means of individual variables (computed from SHARE data) in order to characterize each region of residence.

The paper proceeds as follows. Section 2 explores theories from which we derive our hypotheses on individual and contextual determinants of economic difficulties in old age. Share data is presented in Section 3 along with a regional overview of income poverty and other characteristics of the European regions. In Section 4 we present our model and the (individual and contextual) covariates that we will use. In Section 5 we present our results, and in Section 6 we summarize and discuss our findings.

## **2 Theoretical arguments**

### *2.1 Contextual factors*

National welfare regimes, among other things, try to or ban, or at least limit, poverty, and they can be classified according to how successful they are in this respect (Esping-Andersen 1990; Layte and Whelan 2003; Fouarge and Layte 2005; Scheepers and Te Grotenhuis 2005; Hallberg 2006). Three basic clusters of countries seem to emerge from the literature: a Nordic cluster, with large social spending, high labor force participation, and weak family ties; a Southern cluster, with relatively low welfare provisions, low employment, but strong family ties; and, finally, a cluster for continental Europe, lying somewhere in between (Reher 1998; Daatland and Herlofson 2003; Hallberg 2006).

Recently, this classification has been criticized in several respects. Take the old, for instance: the use of a wider range of indicators to measure their standard of living leads to a more complex typology than that originally proposed (Glaser et al. 2004). And Börsch-Supan (2007), after scrutinising the generosity of the European welfare states towards the elderly on the basis of both aggregate data (Eurostat and OECD) and survey data (SHARE), goes as far as to venture that a European welfare state model may not really exist, and that the classification proposed by Esping-Andersen (1990; 1999; 2003) masks major differences within each cluster.

Beside the heterogeneity between supposedly homogeneous welfare states, intra-country differences, too, are important in this respect: regional poverty rates, for instance, may vary as significantly as they do between countries (Fahei et al. 2005). In this sense, the regional context appears to be a sort of “meso-level”, between macro social structures and micro-demographic characteristics, that may be more appropriate for analysis than the national context, in several respects (Testa and Grilli 2006).

In short, it seems reasonable to investigate whether economic difficulties in old age do or do not depend on the type of welfare state to which each country belongs, but also how influential are intra country (regional) differences. SHARE offers a balanced sample of countries in this respect: some are Scandinavian (Denmark and Sweden), some belong to Central Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands) and some to the Mediterranean Area (Spain, Italy and Greece). Can a clear-cut North-South divide be identified, as Esping-Andersen suggests, or do we observe a more complex picture? For instance: do regions matter? Are older Europeans more likely to be in economic difficulties if they live in an economically disadvantaged region?

## 2.2 *Individual factors*

The elderly form a very heterogeneous group, whose economic conditions range from affluence to deprivation (see, e.g., Avramov 2002; Légaré, Martel 2002; Smeeding 2003; De Santis et al. 2005). Here, we provide a framework of the possible individual-level correlates of such diverse situations.

A first potentially relevant factor is household composition. Larger households benefit from greater economies of scale, but are more often made up of relatively poor people. At the other extreme, living alone, especially in old age, is frequently associated with scarce economic resources (De Santis et al., 2005). Note that the living arrangement is closely linked to the marital status, and it is difficult to separate the effect of the two dimensions, also considering that past demographic events typically continue to exert some effects well into old age: age at marriage, divorce, widowhood, fertility, etc. Besides, all this is gender specific: for instance, married men tend to earn relatively more than their unmarried counterparts, and married women relatively less. In general, men are better off than women: not only do they earn more in their adult years, and in old age, through higher pension benefits, but they also tend to remain married until they die, while most women survive their spouses and end up as widows (Waite 2004). Here, in line with

most of the literature, we expect living alone to be associated with worse economic conditions for older Europeans.

Education, too, is a well-established pivotal factor in determining the personal income of an elderly. It acts basically through the labor market, but probably also through other channels, such as marriage or personal relations (e.g. Regnerus et al. 1998; Scheepers and Te Grotenhuis 2005).

Housing conditions and tenure also matter, in that they reveal the economic resources of the household. Less clear is the role of the area of residence: rural residence is often correlated with poverty in the developing countries (Reardon and Vosti 1995), but the connection can be subtler in the developed countries: as towns tend to become overcrowded, living in the countryside may become a luxury. In general, however, poverty among the rural elders of the industrialized nations represents the accumulated effects of life experiences in environments of relative economic deprivation (e.g. Glasgow 1993).

Health, too, may have an impact on the socio-economic status, but the issue is complicated because the causal relation can be bi-directional, and because macro-analyses occasionally lead to contrasting conclusions. The relationship between income and health does not always emerge (Grossman 1982), and, when it does, it may be either negative (Auster et al. 1969) or positive (Hadley 1992). Micro-level studies have normally concentrated on the (perceived) health status *per se* (Egidi 2003; Egidi and Spizzichino 2006; Egidi et al. 2007), and only rarely have they investigated by how much it affects the economic well being, for instance by lowering the earning capacity, or by raising expenses (De Santis et al. 2005).

Finally, only a few studies have tested the relationship between the number of children (not necessarily cohabiting) and the economic well-being of the older population in the industrialized nations, mainly because of a lack of proper data, which also frequently leads to uncertain conclusions (Rendall and Bachieva 1998; Couch et al. 1999). Caldwell (1982) postulated, and in 2005 reiterated the view, that the young would transfer resources to their aged parents. As is usually the case, however, the picture is more complicated than what simple models predict: in the developed countries, private intergenerational exchange is normally on a mutual basis, and the prevalent direction is rather downwards, i.e. the elderly give more than they receive (Lee and Kramer 2002). In Italy, this is especially true of the aged parents who still have adult children living with them (De Santis et al. 2008). More generally, being childless in one's old age does no longer lead to poverty, as it was probably the case in pre-industrial societies, and may even prove

economically advantageous (Rempel 1985), although the childless may be tempted to spend more and save less during their working lives (Bloom and Pebley 1982), and, in old age, may be obliged to purchase personal assistance, in case of need.

To summarize: the impact of the number of children on the relative economic well-being of the elderly, if any, is ambiguous.

### **3 Data description and overview**

We take our data from the database “Survey of Health, Aging and Retirement in Europe” (SHARE 2.0.1; <http://www.share-project.org/>). SHARE is a multidisciplinary and cross-national database of freely accessible micro data on health, socio-economic status and social and family networks of individuals aged 50 or over (born in 1954 or earlier), living in Austria, Belgium, Denmark, France, Germany, Greece, Italy, Israel, the Netherlands, Spain, Sweden, and Switzerland<sup>1</sup>. We consider all these countries, excluding Israel.

Income is expressed in Euros and adjusted for differences in purchasing power. Gross household income in SHARE is the sum of several components: gross income from employment, self-employment, pensions and other social security benefits, private regular transfers, asset income, and rent payments received. We transform this sum into (gross) equivalent income by applying an equivalence scale: the square root of the number of household members.

Poverty is a complex state that emerges when restrictions on material, cultural and social resources are so severe as to exclude people from minimal social participation. In this case, we will stick to the narrower notion of relative monetary poverty, which, however, is strictly correlated to other spheres of deprivation. We computed two different measures of income poverty, and compared the results with a third one (Table 1).

---

<sup>1</sup> Detailed information on SHARE can be found in Börsch-Supan et al. (2005).

Table 1 – Percentage of people in economic difficulties among people according to different definitions and data, 11 EU countries, 2004.

Criterion 1			Criterion 2			Criterion 3	
Country	% Poor	Cut-off point	Country	% Poor	Cut-off point	Country	% Poor
<b>SE</b>	20.2	13 184	<b>SE</b>	23.2	23 075	<b>SE</b>	9.0
<b>FR</b>	25.8	10 549	<b>NL</b>	29.6	22 056	<b>NL</b>	11.0
<b>BE</b>	27.5	9 928	<b>DE</b>	31.1	19 247	<b>DE</b>	12.0
<b>DK</b>	27.7	9 139	<b>FR</b>	32.9	19 338	<b>AT</b>	12.0
<b>AT</b>	27.7	11 043	<b>AT</b>	37.0	21 070	<b>DK</b>	12.0
<b>GR</b>	28.5	5 591	<b>BE</b>	38.5	20 386	<b>FR</b>	13.0
<b>NL</b>	28.6	14 319	<b>CH</b>	38.8	28 202	<b>BE</b>	15.0
<b>DE</b>	29.0	11 833	<b>DK</b>	39.2	27 109	<b>IT</b>	19.0
<b>IT</b>	29.1	8 102	<b>GR</b>	40.6	12 672	<b>GR</b>	20.0
<b>ES</b>	32.1	5 505	<b>IT</b>	42.7	17 169	<b>ES</b>	20.0
<b>CH</b>	32.2	14 277	<b>ES</b>	47.5	14 802	<i>CH</i>	-
<b>Average</b>	<b>28.0</b>	<b>10 315</b>	<b>Average</b>	<b>36.5</b>	<b>20 466</b>	<b>Average</b>	<b>14.3</b>

Notes:

Criterion 1: % of people in economic difficulties before social transfers. Cut-off point: 60% of median equivalent income before social transfers, as computed from SHARE (our calculation).

Criterion 2: % of people in economic difficulties before social transfers. Cut-off point:  $y/\sqrt{2}$ , where  $y$  = per capita *GDP* (national values, in Euros 2004). This means that  $y$  = Cut-off point for a household of 2. *GDP* stems from Eurostat, but percent computed from SHARE (our calculation).

Criterion 3: % of people in economic difficulties after social transfers. Cut-off point for individuals: 60% of median equivalent income after social transfers, as computed by EUROSTAT (not given).

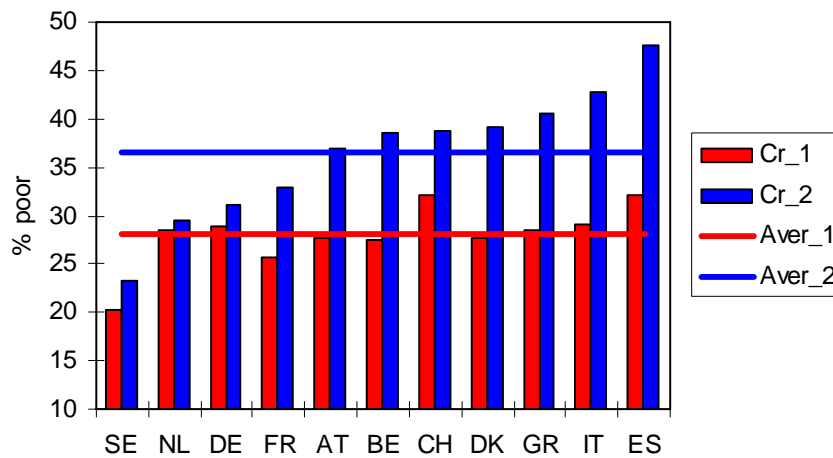
Thresholds refer to households of 1. For larger households, equivalence factors  $E_n$  apply.  $E_n = \sqrt{N}$ , where  $N$ =number of household members.

AT=Austria; BE=Belgium; CH=Switzerland; DE=Germany; DK=Denmark; ES=Spain; FR=France; GR=Greece; IT=Italy; NL=the Netherlands; SE=Sweden.

Source: Owns elaboration on SHARE (2004) and Eurostat data.

With criterion 1 we consider poor those individuals whose gross equivalent income lies below the poverty threshold, 60% of the equivalent median gross income for each country as calculated from SHARE. This is the poverty line customarily adopted with SHARE (see, e.g., Hallberg, 2006), but it is not fully convincing, because it is based on the income distribution of a limited and selected part of the population, those with 50 years or more. This is probably the reason why poverty rates are so high for Switzerland, for instance (see Figure 1), which does not generally emerge with other databases (Förster and d’Ercole, 2005).

Figure 1 – Percentage of people in economic difficulties, 11 EU countries, 2004.



Notes: For Criteria 1 and 2, cf. Table 1. AT=Austria; BE= Belgium; CH=Switzerland; DE=Germany; DK=Denmark; ES=Spain; FR=France; GR=Greece; IT=Italy; NL=the Netherlands; SE=Sweden.  
Source: Own elaboration on SHARE (2004) data.

The alternative that we will consider here is to define the poverty threshold of a household of two members as the average GDP per capita<sup>2</sup>, drawn from official (Eurostat) data. Our poverty line thus depends on the whole distribution of incomes, but we count our poor on the basis of SHARE data. With this line, a north-south poverty gradient seems to emerge (Figure 1), with poverty among the old gradually increasing as one moves from Sweden and the Netherlands to Greece, Italy, and Spain. The threshold is high (on average, twice as high as with criterion 1), but absolute levels matter less than ranking, in this case<sup>3</sup>, and this does not depend on how high the threshold is: it depends on the criterion on which it is built. The proportions poor that we obtain with criterion 2 seem to be more convincing in themselves and more consistent with the results of the third criterion considered in Table 1: the proportion poor in each country after social transfers<sup>4</sup>. We will therefore use criterion 2 for defining the poor in our analysis.

<sup>2</sup> This is the standard practice Istat uses for defining poverty on the basis of its consumer survey. See, e.g., Istat (2007).

<sup>3</sup> This is merely another way of saying that poverty lines are arbitrary. In all cases, we have also tried a sensitivity analysis, with thresholds at 50% and 75% of the level shown in table 1 (criterion 2): absolute levels change, obviously, but the rest (ranking and, later on, the sign and significance of the parameters of the regression models) remains unaffected.

<sup>4</sup> The correlation coefficient between the proportion poor in the countries considered in Table 1 is .66 between criteria 3 and 1, but rises up to .86 between criteria 3 and 2.



Note that all of these criteria use country-specific poverty lines, under the implicit assumption that people compare themselves to their country fellows. There are reasons for considering both stricter approaches (whereby people compare themselves to their neighbours, i.e. to those that they see in person everyday) and larger approaches (people compare themselves to other Europeans, who are now easier to reach; see e.g. Brandolini 2007). The implications of these alternative choices are very profound, not only theoretically, but also from a practical point of view, because the ranking of regions according to their poverty levels change dramatically. Which criterion is preferable – a regional, national, or European poverty line – is unclear: this study, as mentioned, uses a national poverty line.

Let us now go below the national level, and use the so-called NUTS regions at the first level of Eurostat classification, also known as NUTS-1 ([www.eurostat.com](http://www.eurostat.com)). Although NUTS-1 units are not defined everywhere exactly in the same way, and vary greatly in size and other characteristics, they have become a sort of standard of reference, also for the formulation and implementation of social policies, and several statistical indicators are available at this level, especially from Eurostat. The number of NUTS-1 regions that we considered for each country is shown in Table 2.

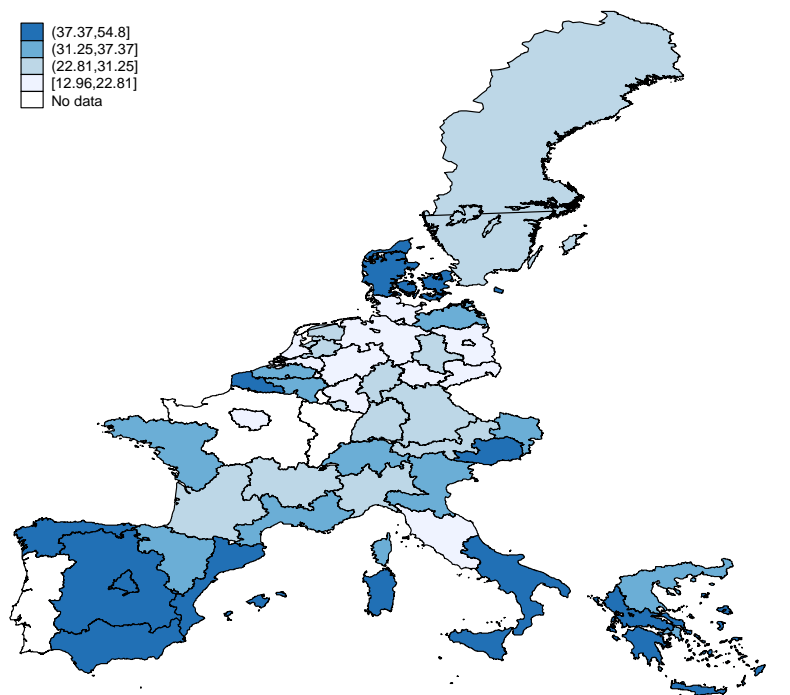
Table 2 – Hierarchical structure of the data: old respondents (65+), regions, and countries.

Country	Number of:		Respondents in regions	
	Regions	Responents	Min	Max
Austria	3	701	137	307
Belgium	3	1091	46	648
Denmark	1	477	-	477
France	6	913	108	236
Germany	16	836	14	167
Greece	4	890	74	378
Italy	5	785	90	196
Netherlands (the)	4	703	102	326
Spain	7	845	34	217
Sweden	1	910	-	910
Switzerland	1	316	-	316
<b>TOTAL</b>	<b>51</b>	<b>8467</b>	<b>14</b>	<b>910</b>

Note: France and Germany do not have the all the NUTS level 1 details available within the SHARE dataset. As a consequence the regions considered in this analysis are fewer than those that make up France (9) and Germany (17). Source: Own elaborations on SHARE (2004) data.

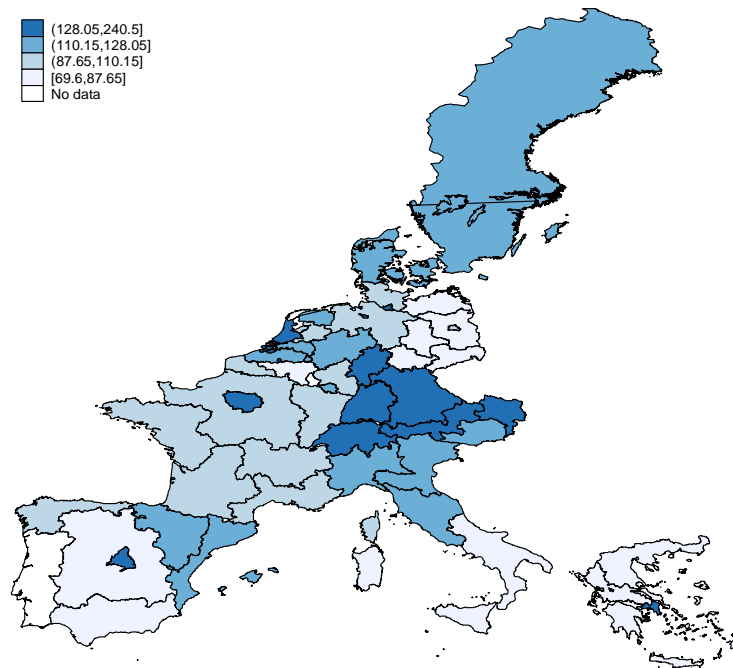
Fig. 2 shows how heterogeneous the proportion poor (our dependent variable, in Sections 4 and 5) is at the regional level, and Figures 3 to 5 show the average regional values of some of our contextual, independent variables: the purchasing power parity per inhabitant (Figure 3), the growth rate of the regional GDP (Figure 4), and the unemployment rate (Figure 5). All these indicators, and others not shown in the maps, prove that variability is high not only between nations, but also between regions within nations.

Figure 2 – Proportion in economic difficulties among the old (50+), NUTS-1, 2004 (Criterion 2, Table 3).



Note: Classes formed with the natural breaks method (Jenks, 1963).  
Source: Own elaboration on SHARE (2004) data.

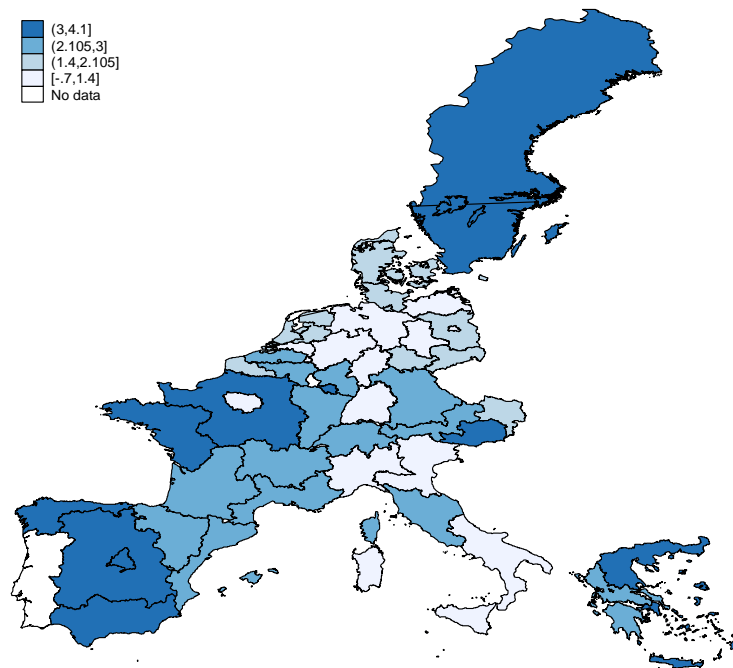
Figure 3 – Purchasing power parities per inhabitant in percent of the EU average, NUTS-1, 2004.



Note: Classes formed with the natural breaks method (Jenks, 1963).

Source: Own elaboration on Eurostat data: <http://epp.eurostat.ec.europa.eu>.

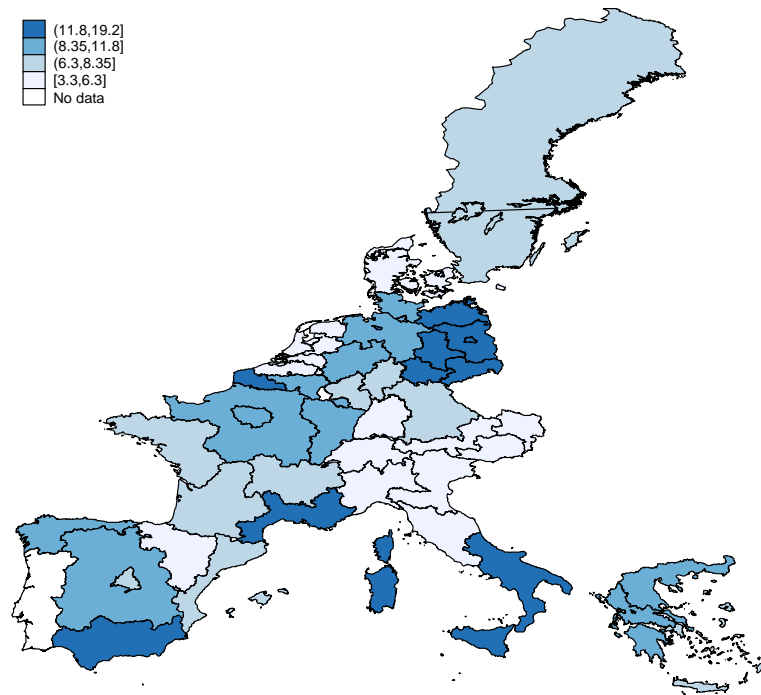
Figure 4 – Real growth rate of regional GDP at market prices – % change 2003/2004, NUTS-1.



Note: Classes formed with the natural breaks method (Jenks, 1963).

Source: Own elaboration on Eurostat data: <http://epp.eurostat.ec.europa.eu>.

Figure 5 – Unemployment rate, per NUTS level 1, 2004.



Note: Classes formed with the natural breaks method (Jenks, 1963).

Source: Own elaboration on Eurostat data: <http://epp.eurostat.ec.europa.eu>; and, for Switzerland on Index Mundi data: <http://www.indexmundi.com/switzerland>.

#### **4 A multilevel approach**

Our purpose is to study the diffusion of poverty in Europe and its correlates, both at the individual and at the contextual level. In order to do this, we apply a logistic multi-level regression model with random intercept, because both our hypotheses and our data are hierarchically structured (individuals living in different regions) and because we treat our dependent variable as dichotomous: poor / non poor (Agresti 2002). This model allows for the grouping of observations into homogeneous geographical areas, where clustering is not an occasional nuisance, but an intrinsic characteristic of the population, explicitly considered in the model (Latrice Sykes 2003).

We carried out our estimation procedure in three steps. Firstly, we estimated the so-called null model, to test whether our data does or does not require a multilevel analysis - and the answer is yes. Secondly, we estimated a model with only first- (i.e. individual-) level variables, so as to better see in what sense, and how strongly, they act. Finally, we estimated the complete model,

including both first and second level variables so as to be able to interpret the variability associated with the context.

As for the first step, the response variable  $y_{ij}$ , measured at the first (or individual) level, assumes value 1 if individual  $i$  from region  $j$  is experiencing economic difficulties, 0 otherwise. Let  $P_j$  be the probability that any person from region  $j$  be experiencing economic difficulties. Mathematically, the null model is:

$$1) \quad y_{ij} = P_j + e_{ij}$$

where the response value for person  $i$  from region  $j$  is given by the average probability of region  $j$  plus a first-level residual component  $e_{ij}$  with mean 0 and a variance that depends on  $P_j$ . Consider now the logit transformation that leads to normal distributed  $P_j$  probabilities:

$$2) \quad \text{logit}(P_j) = \gamma + U_j$$

where the intercept  $\gamma$  gives the average value of the (transformed) probability for the entire population, while  $U_j$  is the deviation from this value for region  $j$ . The residuals  $U_j$ , peculiar to multilevel models, represent the second-level random effects, for which we assume a normal distribution with mean 0 and constant variance  $\tau^2$ . The null model permits us to test the significance of parameter  $\tau^2$ : we compare the model deviance (twice the natural logarithm of the Likelihood) with the deviance resulting from the same model without the  $U_j$  residuals, and we run a Likelihood-Ratio test. As we will see shortly, this test shows that the region of residence does influence income poverty, which indicates that multi-level analysis is appropriate.

The second step was the estimation of a random intercept hierarchical model with individual variables only. This model is  $y_{ij} = P_{ij} + e_{ij}$ , where  $P_{ij}$  is the probability that a person  $i$  from region  $j$  be in economic difficulties, determined as follows:

$$3) \quad \text{logit}(P_{ij}) = \gamma + \sum_{h=1}^H a_h X_{hij} + U_j ; \quad U_j \sim N(0, \tau^2)$$

The second-level random components  $U_j$ , the same as in the null model, now represent the residual effect of every region  $j$  on the response variable, “net” of the  $H$  individual characteristics considered in  $X_{Hi}$ .

As for the individual covariates, we considered quite a few. All the covariates refer to the time of the interview and are categorical, although we frequently had to collapse categories, because

sample observations shrink very rapidly. Our variables and their categories are listed in Table 3 as well as a few basic descriptive statistics. The model parameters were estimated forwards.

Table 3 – Description of the individual-level covariates, 11 EU nations, 2004, respondents aged 65+.

<b>Variables</b>	<b>Abs.</b>	<b>%</b>	<b>Variables</b>	<b>Abs.</b>	<b>%</b>
<i>Economic difficulty</i>			<i>Children</i>		
No	6 671	78.8	Childless / no living child	1 282	15.1
Yes	1 796	21.2	1	1 547	18.3
<i>Sex</i>			2+	5 638	66.6
Male	3 767	44.5	<i>N. of helps received last year (*)</i>		
Female	4 700	55.5	0	5 884	69.5
<i>Age classes</i>			1	1 242	14.7
65-69	2 599	30.7	2+	1 341	15.8
70-74	2 160	25.5	<i>Housing status</i>		
75+	3 708	43.8	Owner	5 415	64.0
<i>Household composition</i>			Tenant	2 150	25.4
Ego alone	3 746	44.2	Rent free / other	902	10.7
Couple alone	3 648	43.1	<i>Area of building</i>		
With family / with others	1 073	12.7	A big city	1 301	15.4
<i>Siblings</i>			Suburbs or outskirts of a big city	1 434	16.9
0/no siblings alive	1 192	14.1	A large town	1 657	19.6
1	2 144	25.3	A small town	2 153	25.4
2	1 588	18.8	A rural area or village	1 922	22.7
3+	3 543	41.8	<i>Self-perceived help</i>		
<i>Educational level</i>			Very good	992	11.7
Primary education	5 395	63.7	Good	3 336	39.4
Secondary education	1 890	22.3	Fair	3 034	35.8
Tertiary education	1 182	14.0	Bad	895	10.6
			Very bad	210	2.5
<b>Total</b>	<b>8 467</b>	<b>100</b>	<b>Total</b>	<b>8 467</b>	<b>100</b>

(\*) From outside the household.

Source: Owns elaboration on SHARE (2004) data

The respondent's age is coded in three categories: 65-79, 70-74, and 75+. The household composition has three categories: ego alone, couple alone, and ego living with relatives or others. The number of living siblings is coded using three modalities: no (living) siblings, one, and two or more. The number of living children is grouped similarly: no (living) child, one, two, and three or more. The educational level, which is harmonized at the international level through the

International Standard Classification of Education (ISCED) of the UNESCO (<http://www.uis.unesco.org>), is coded in the customary way: primary, secondary, and tertiary education. The social support is coded looking at number of cases when help was received from outside the household during the last year (for care, practical tasks, administrative tasks, or other): 0, 1, and 2+. The housing status is coded employing three categories: owner, tenant, and other (including rent-free). The area of residence has the following modalities: a big city, the suburbs or outskirts of a big city, a large town, a small town, and a rural area or village. Finally, the SHARE database contains a detailed battery of questions relative to health and health expenditure. Since one measure often used in the health literature is self-perceived health, and since this proved sufficiently variable in our preliminary analyses, we decided to keep it, categorizing it as follows: very good, good, fair, bad, and very bad.

Multilevel models offer the possibility of considering not only individual information, but also covariates relative to a higher level of analysis, enabling to partly “control” for the  $U_j$  variability. Following a standard practice in the literature (Snijders, Bosker 1999), among our macro variables we considered the regional means of a few of our individual variables (variables  $\bar{X}_{kj}$ ), and we also selected a group of other, and in our view meaningful, regional indicators (variables  $Z_{mj}$ ), taken directly from an external source, in our case Eurostat ([www.eurostat.org](http://www.eurostat.org)). These are: the purchasing power parity per inhabitant (percentage of the EU average); beds in hospital per 100,000 inhabitants; the unemployment rate; the long-term unemployment rate (i.e., the share of those unemployed for more than six months), and the participation of adults aged 25-64 in education and training. Formally:

$$3) \quad \text{logit}(P_{ij}) = \gamma + \sum_{h=1}^H a_h X_{hij} + \sum_{k=1}^K b_k \bar{X}_{kj} + \sum_{m=1}^M c_m Z_{mj} + U_j ; \quad U_j \sim N(0, \tau^2)$$

The share database contains information on about 30,000 individuals aged 50 and over. For this study, however, we selected only 8,467 of them, with at least 65 years. These 8,467 individuals are nested in 51 regions belonging to 11 countries (Table 2). Minimum and maximum cluster sizes are, respectively, 14 and 910, but note that we needn't worry about the unbalanced structure of the SHARE sample, which is efficiently handled by maximum likelihood methods (Snijders, Bosker 1999).

## 5 Results

Table 4 presents the multilevel regression parameter estimates that eventually survived as significant. Before reading the table, please consider that we also tried alternative poverty lines, at 50% and 75% of that eventually retained (criterion 2 in table 1), so as to come closer to the prevalence rates normally used in this type of study. The results that we obtained, not shown here, differ only marginally from those of table 4, which therefore appear to be fairly robust.

As expected, age is significantly correlated with poverty among the old: the oldest (75 or more) have a higher risk of being poor than their counterparts. Gender matters, too, and men are slightly better off in economic terms: their odds-ratio of being poor, O.R., is about 23% lower).

As for the family background, living in couple significantly alleviates the risk of poverty (O.R.=34%, i.e. about 66% less than standard), and so does living in larger families (O.R.=49%). The presence of (adult) children is associated with a lower risk of poverty, but the effect is modest with only one child (-18%), and vanished (almost) completely with 2 children or more.

Education proves, once again, one of the most important predictors of poverty, also among older Europeans. Medium education reduces the odds of poverty by as much as 53%, and high education by 71%. Besides, as expected, home-owners are less frequently poor than tenants. As for the place of residence, poverty is more widespread in rural areas or villages, but, outside that, as the surrounding gets more and more densely crowded, no clear trend can be noted.

A good or very good perceived health status reduces the odds of being poor; conversely, those who report very bad health conditions frequently also suffer from a lack of economic resources, which is in line with expectations.

Let us now move on to the second level of our analysis, where we use contextual variables. Here, only two of our variables preserved their significance within a multivariate model: a larger share of home-owners in the region reduces the proportion poor, and so does economic growth. Other second-level covariates (e.g. purchasing power parities; beds in hospitals per 100,000 inhabitants, and long-term unemployment rate), significant when treated alone, proved non significant within the final model.



Table 4 – The correlates of economic difficulties in old age, 11 EU nations, 2004: a logistic multi-level regression model with random intercept

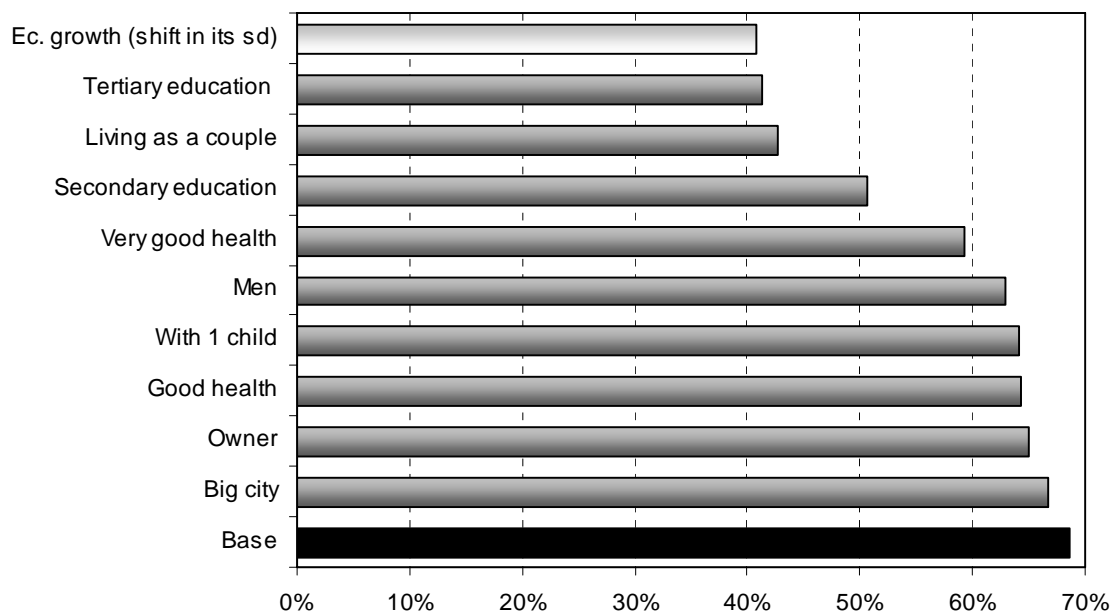
Variable	Categories	Coeff.	OR	St. Err.	zvalue	pvalue
<i>Individual covariates</i>						
Sex	Female (ref.)	0	1			
	Male	-0.26	0.77	0.060	-4.34	0.000
Age class	75+ (ref.)	0	1			
	70-74	-0.13	0.88	0.067	-1.99	0.047
	65-69	-0.13	0.88	0.067	-1.93	0.053
Household composition	Ego alone (ref.)	0	1			
	Couple alone	-1.08	0.34	0.069	-28.19	0.000
	With family / with others	-0.71	0.49	0.090	-16.33	0.000
Children alive	0 / dead (ref.)	0	1			
	1	-0.2	0.82	0.091	-2.24	0.025
	2+	-0.1	0.9	0.075	-1.39	0.164
Education	Primary education (ref.)	0	1			
	Secondary education	-0.76	0.47	0.076	-9.99	0.000
	Tertiary education	-1.24	0.29	0.100	-12.46	0.000
Housing	Tenant (ref.)	0	1			
	Owner	-0.17	0.84	0.071	-2.39	0.017
	Rent free / other	0.03	1.03	0.096	0.34	0.735
Area of residence	Rural area or village (ref.)	0	1			
	Small town	-0.32	0.72	0.099	-3.27	0.001
	Large town	-0.32	0.72	0.095	-3.42	0.001
	Big city suburbs	-0.22	0.8	0.088	-2.56	0.011
Self-perceived health	Big city	-0.09	0.92	0.081	-1.08	0.279
	Very good	-0.41	0.66	0.099	-4.13	0.000
	Good	-0.20	0.82	0.062	-3.14	0.002
	Fair (ref.)	0	1			
	Bad	0.00	1.00	0.090	-0.01	0.994
	Very bad	0.33	1.4	0.155	2.15	0.032
<i>Regional-level covariates</i>						
	Proportion of home ownership	-0.04	0.96	0.071	-0.58	0.565
	Regional GDP growth rate	-0.10	0.90	0.072	-1.39	0.163
	Constant	0.45		0.267	1.69	0.09
	Regional-level variance	0.40		0.051		
	Log-likelihood	-4289				

(\*) % change previous year, at market price.

Source: Owns elaboration on SHARE (2004) data.

Figure 6 shows the predicted probabilities of being in economic difficulty for selected hypothetical individuals. The baseline is a person whose individual covariates all maximize the risk of economic difficulties in old age, as they result from our model estimates. The figure shows that the most effective *individual* variable in combating poverty is education. Next best is living in couple instead of living alone. Note, however, that collective variables may be even more important: an increase in the regional GDP by one standard deviation above average reduces the odds of being poor by about 0.3.

Figure 6 – Predicted probability of economic difficulties in old age: improvements from the base (worst) case.



Elaborations on the results of the logistic multi-level regression model shown in Table 4.

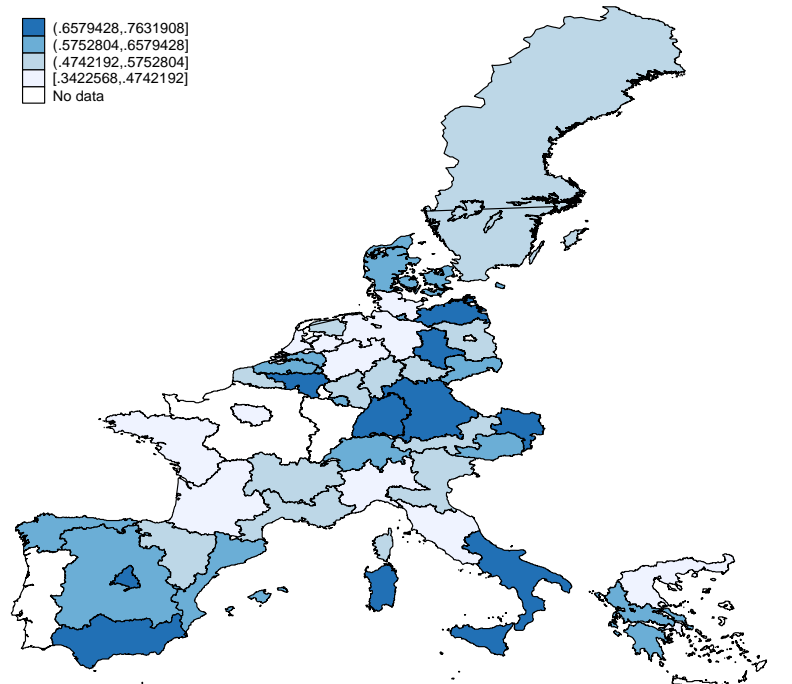
Notes: Base = female, living alone, without living children, with primary education, tenant, living in a rural area or village, perceiving her own health status as very bad. The change in the *economic growth* (i.e. percentage change over preceding year, at market price) is one standard deviation (1.06).

Reading: *ceteris paribus*, women with tertiary education, for example, have lower probabilities of being economically poor than the baseline: little more than 40%, as opposed to almost 70% .

Figure 7 displays the predicted probabilities of being in economic difficulty per region of residence, taking again as a reference a person whose individual covariates maximize the risk of being poor. Regional variability appears to be one of our the most relevant findings: the South in

Italy, Spain and Belgium, and southern and eastern Germany are the areas where poverty risks are highest.

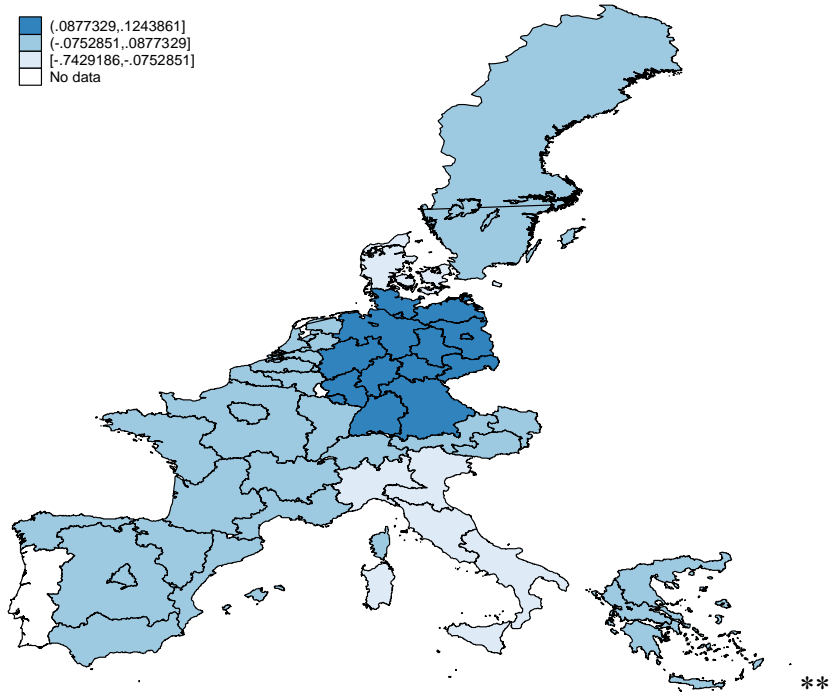
Figure 7 – Predicted probabilities of being poor, per region of residence. Individuals aged 65 or more, in 11 EU Nations in 2004.



Elaborations on the results of the logistic multi-level regression model shown in Table 4.  
Note: Classes are formed through the natural breaks method (Jenks, 1963).

Regional and national differences can also be analyzed by looking at the random effects (empirical Bayes residuals) of the model. These convey all the regional-level factors that have not been observed: regions with high, positive or negative, residuals reveal a poverty risk that is "unexpected", given the estimates of our model. Specifically, the positive values, reveal the presence of unobserved contextual factors that increase the risk of poverty, and *viceversa*. For the fitted model, the standardized empirical Bayes residuals at national and regional level are presented in Figures 8 and 9.

Figure 8 – National standardized empirical Bayes residuals from the fitted model. Individuals aged 65 or more, in 11 EU Nations, in 2004.

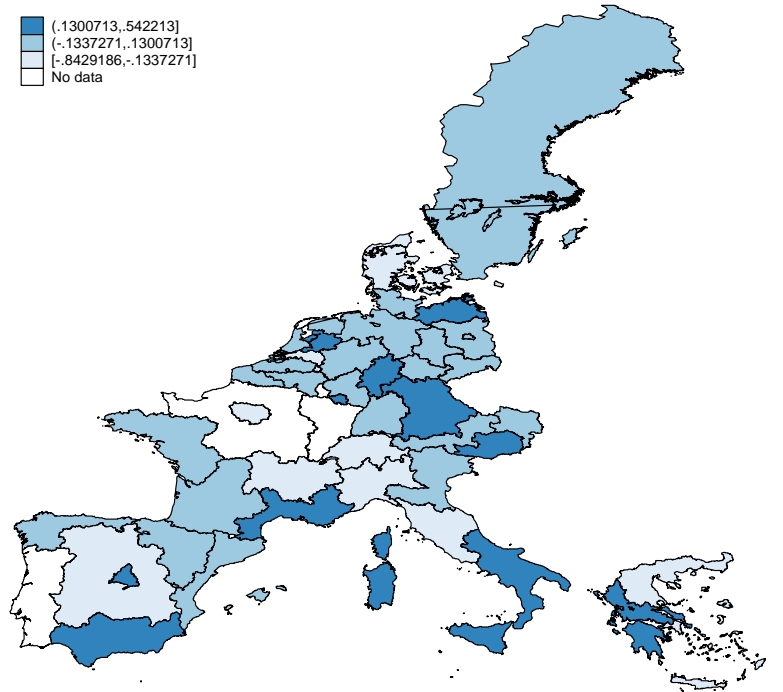


Elaborations on the results of the logistic multi-level regression model shown in Table 4.

Note: Class intervals are centered on the arithmetic mean. The central class contain values that do not differ by more than one standard deviation from the general mean. Positive (negative) values reveal the presence of unobserved factors that increase (reduce) the risk of poverty.

Figure 8 shows that the picture that emerges at the national level is basically one of very good fit between the observed and the predicted probabilities of being poor: national peculiarities are generally not very important, except for Germany, where poverty is significantly (at least one standard deviation) higher than expected, and Italy and Denmark, where it is lower. However, working at the regional level reveals a (partly) different story.

Figure 9 – Regional standardized empirical Bayes residuals from the fitted model. Individuals aged 65 or more, in 11 EU Nations, in 2004.



Elaborations on the results of the logistic multi-level regression model shown in Table 4.

Note: Class intervals are centered on the arithmetic mean. The central class contain values that do not differ by more than one standard deviation from the general mean. Positive (negative) values reveal the presence of unobserved factors that increase (reduce) the risk of poverty.

The logic of Figure 9 is the same, but we can now see that, within nations, there are heterogeneous regional values. Take Spain, for instance: Madrid and the South are at a clear disadvantage, but this does not emerge at the national level, because it is compensated by the comparatively good performance of the Centre region. Italy, to cite another example, appears to be good overall (less poverty than the model would predict), but this is only true of its central and northwestern parts. In the south, the opposite is true, and poverty is more widespread than theoretically expected (given all the other covariates considered in the model). At the other extreme, not all of Germany performs poorly; this is only true of a few regions: e.g. Mecklenburg-Vorpommern (in north-eastern part), Hessen (in central part) and Bavaria (in south-eastern part).

## 6 Discussion

The risk of being relatively poor varies considerably among the aged. Starting from individual-level factors, we found that the educational level is one of the most important correlates of low poverty risk: not surprisingly, those with secondary and tertiary education are significantly better off than others. Higher education represents a valid proxy of past work (and current pension) income, but also, probably, of a greater ability in managing one's savings, or complying with fiscal obligations. In all cases, this is good news: the education level of the future generation of the elderly is on the rise, and this creates good prospects also for their economic situation.

But other elements push in the opposite direction. Take living arrangements, for instance: co-residence alleviates the risk of poverty, by multiplying sources of income. However, household size tends to shrink everywhere in Europe, and especially at older ages: this throws a shadow on the perspective economic well-being of the older Europeans of the future.

As we saw above, the risk of being in economic difficulties is also influenced by contextual variables, which actually appear to be perhaps as important as, if not more important than, individual variables. We verified that the factors affecting poverty in each area are not merely the weighted sum of the effect of the more disadvantaged people within the same area: they are also significantly influenced by the specific context of residence. The latter absorbs a great part of the variability observed in economic difficulties, given the observed individual characteristics. Regions with faster levels of economic development, in fact, experience higher levels of poverty alleviation.

Moreover, regional variability in income poverty appears to be important. All in all, regional variability within nations strikes more than a north-south gradient in poverty levels, and the presence of the three or four archetypical welfare-state models - à la Esping-Andersen (1990, 1999, 2003) - may be questioned. If poverty is more concentrated in some areas of a country than in others, geographic targeting may be important in fighting it. In other words, at least among the elderly, resources aimed at poverty reduction might have to be directed primarily towards a few selected localities. Since this involves, among other things, a close cooperation between central government and local authorities, acting in this direction is not going to be simple.

## 7 Acknowledgment

Financial support from the UE – Sixth Framework Programme: "Major Ageing and Gender Issues in Europe – MAGGIE" (Contract no.: CIT5 – 028571) is gratefully acknowledged. We thank Elena Pirani, Giambattista Salinari and Silvana Salvini for their comments on an earlier draft.

## 8 References

- Agresti, A. (2002). *Categorical data analysis*. Second Edition. New York: Wiley.
- Avramov, D. (2002). People, demography and social exclusion. *Population Studies*, 37.
- Auster R., Leveson, I. & Sarachek D. (1969). The production of health, an exploratory study. *Journal of Human Resources*, 4, 411-436.
- Bloom, D.E. & Pebley, A.R. (1982). Voluntary childlessness: a review of evidence and implications. *Population Research and Policy Review*, 1, 203-224.
- Börsch-Supan, A., Brügiavini, A., Jürges, H., Mackenbach, J., Siegrist, J. & Weber, G. (Eds.) (2005). *Health, ageing and retirement in Europe – first results from the survey of health, ageing and retirement in Europe*. Mannheim: MEA.
- Börsch-Supan, A. (2007). European welfare state regimes and their generosity towards the elderly, *Economics Working Paper Archive* 479. [http://www.levy.org/pubs/wp\\_479.pdf](http://www.levy.org/pubs/wp_479.pdf)
- Brandolini, A. (2007). Measurement of income distribution in supranational entities: the case of the european union, Banca d'Italia. Temi di discussione del Servizio Studi, n. 623, April.
- Caldwell, J.C. (1982). *Theory of fertility decline*. New York: Academic Press.
- Caldwell, J.C. (2005). On net intergenerational wealth flows: an update. *Population and Development Review*, 31(4), 721-740.
- Couch, K.A., Daly M.C. & Wolf D.A. (1999). Time? Money? Both? The allocation of resources to older parents. *Demography*, 36(2), 219-232.
- Daatland, S.O. & Herlofson, K. (2003). Lost solidarity' or 'changed solidarity': a comparative European view of normative family solidarity. *Ageing Society*, 23, 537–560

- De Santis, G., Seghieri C. & Tanturri M.L. (2005). The economic well being of older Europeans. WP 2005/02. Department of Statistics “G. Parenti”.  
[http://www.ds.unifi.it/ricerca/pubblicazioni/working\\_papers/2005/wp2005\\_02.pdf](http://www.ds.unifi.it/ricerca/pubblicazioni/working_papers/2005/wp2005_02.pdf)
- De Santis, G., Seghieri, C. & Tanturri M.L. (2008). Children and standard of living in old age. *Genus*, forthcoming.
- Dewilde, C. (2006). Multidimensional poverty in Europe: individual and institutional determinants. *OASES WP*, September.
- Egidi, V. (2003). Health status of older people. *Genus*, 59(1), 169-200.
- Egidi, V. & Spizzichino, D. (2006). Perceived health and mortality: a multidimensional analysis of ECHP Italian data. *Genus*, 61(3-4), 135-154.
- Egidi, V., Salvatore, M.A. & Spizzichino, D. (2007). The perception of health: relevance and dimensions. Proceedings of the 2007 intermediate conference of the Italian Statistical Society “Risk and Prediction”, Università Ca’ Foscari Venezia, 6-8 June, 2007.
- Esping-Andersen, G. (1990). *Three worlds of welfare capitalism*. Cambridge: Polity Press.
- Esping-Andersen, G. (1999). *Social foundations of post industrial economies*. Oxford/New York: Oxford University Press.
- Esping-Andersen, G. (2003). A Welfare State for the 21st Century. In A. Giddens (Ed.), *The global third way debate* (pp. 134-146). Polity: Oxford.
- Fahey, T. Whelan, C.T. & Maître, B. (2003). First European quality of life survey: income inequalities and deprivation, European foundation for the improvement of living and working conditions. <http://www.eurofound.europa.eu/pubdocs/2005/93/en/1/ef0593en.pdf>
- Fouarge, D. & Layte, R. (2005). Welfare regimes and poverty dynamics: The duration and recurrence of poverty spells in Europe. *Journal of Social Policy*, 34, 407-426.
- Förster, F. & d'Ercole, M. (2005). Income distribution and poverty in OECD countries in the second half of the 1990s. OECD Social, Employment and Migration Working Papers, 22, Directorate for employment, labour and social affairs, OECD.
- Glasgow, N. (1993). Poverty among rural elders: trends, context, and directions for policy, *Journal of Applied Gerontology*, 12(3), 302-319.
- Glaser, K., Tomassini, C. and Grundy, E. (2004). Revisiting convergence and divergence: support for older people in Europe. *European Journal of Ageing* 1, 64–72.
- Grossman, N. (1982). Government and health outcomes, *American Economic Review*, may, 192



- Hadley, J. (1992). *More medical care, better health*. Washington DC: The Urban Institute Press.
- Hallberg, D. (2006). Cross-national differences in income poverty among Europe's 50+, Working Paper 2006:14, Department of Economics, Uppsala University.
- Istat (2007). La povertà relativa in Italia, 2006 [Relative poverty in Italy, 2006]. Istat Statistiche in breve, [http://www.istat.it/salastampa/comunicati/non\\_calendario/20071004\\_01/](http://www.istat.it/salastampa/comunicati/non_calendario/20071004_01/).
- Jenks, G. F. (1963). Generalization in statistical mapping. *Annals of the Association of American Geographers* 53, 15-26.
- Layte, R. & Whelan, C. (2003). Moving in and out of poverty: The impact of welfare regimes on poverty dynamics in the EU. *European Societies* 5, 167-191.
- Latrice Sykes, L. (2003). Income rich and asset poor: a multilevel analysis of racial and ethnic differences in housing values among baby boomers, *Population Research and Policy Review*, 22(1), 1-20.
- Lee, R.D. & Kramer, K.L. (2002). Children's economic roles in the Maya family life cycle: Cain, Caldwell, and Chayanov revisited. *Population and Development Review*, 28(3), 475-499.
- Légaré, J. & Martel, L. (2003). Living arrangements of older persons in the early ninety's: an international comparison. *Genus*, 59(1), 85-103.
- Reardon, T. & Vosti S.A. (1995). Links between rural poverty and the environment in developing countries: Asset categories and investment poverty. *World Development*, 23(9), 1495-1506.
- Regnerus, M. Smith, Ch. & Sikkink, D. (1998). Who gives to the poor? The influence of religious tradition and political location on the personal generosity of Americans towards the poor. *Journal of Religious Research*, 36, 168-180.
- Reher, D. (1998). Family ties in western Europe: persistent contrasts. *Population and Development Review* 24, 203-234.
- Rempel, J. (1985). Childless elderly: what are they missing? *Journal of Marriage and the Family*, 47(2), 343-348.
- Rendall, M.S., Bachieva, R.A (1998). An old-age security motive for fertility in the United States? *Population and development review*, 24(2), 293-307.
- Scheepers, P. & Te Grotenhuis, M. (2005). Who cares for the poor in Europe? micro and macro determinants for alleviating poverty in 15 European countries. *European Sociological Review* 21(5), 435-465.

- Smeeding, T. (2003). Income maintenance in old age: current status and future prospects for rich countries. *Genus*, 59(1), 51-83.
- Snijders, T.A.B. & Bosker, R.J. (1999). *Multilevel analysis. An introduction to basic and advanced multilevel modeling*. London: Sage Publications.
- Testa, M.R. & Grilli, L. (2006). The influence of childbearing regional contexts on ideal family size in Europe. *Population*, 61 (1-2), 109-138.
- Waite, L.J. (2004). Introduction: The demographic faces of the elderly. *Population and Development Review*, 30: Supplement: Aging, Health, and Public Policy, 3-16.

Copyright © 2008  
Daniele Vignoli,  
Gustavo De Santis