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

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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. 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, which also exists: poverty appears also significantly influenced by the specific context of residence.

Keywords Poor elderly · Europe · Multilevel approach

Introduction

Europe is undergoing a profound and prolonged process of population aging. The economic conditions of the elderly, among other things, have been studied extensively, both at the national and the cross-national level. This paper, too, aims at analyzing how well, or bad, off older Europeans are, from an economic perspective, and what variables correlate with the worst conditions. To be sure, 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, but in this work we will stick to the narrower notion of relative monetary poverty (lack

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of disposable income), for reasons of simplicity. However, relative monetary poverty is strictly correlated with other spheres of deprivation.

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.

SHARE covers twelve countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, Israel, the Netherlands, Spain, Sweden, and Switzerland), but we decided to exclude two from the analysis: Israel, because it is outside Europe, and Switzerland, because of its low response rate (only 37.6%). SHARE data fits our need, because it offers information on 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.

Local areas, i.e. at the sub-national level, may be more important than thus far recognized in the literature on the study of the geographical distribution of poverty: indeed, economic affluence tends to be more concentrated in some areas than in others, and so do unemployment, infrastructures, technology, high-level occupations, and so forth. If this is the case, the traditional opposition between types of welfares states may have to be reconsidered: Esping-Andersen and others have focused exclusively on between-nation differences, but what if within-nation gradients are of comparable magnitude?

The paper proceeds as follows. Section "Theoretical Arguments" 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 "Data Description and Overview". In section "A Multilevel Approach" we present our model and the (individual and contextual) covariates that we will use. In section "Who are the Poor Older Europeans?" we present our results, and in section "Discussion" we summarize and discuss our findings.

Theoretical Arguments

Contextual Factors

National welfare regimes, among other things, try to eradicate, or at least limit, poverty, and they can be classified, among other criteria, 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.

Besides 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 (Fahey 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). There are at least two possible reasons why old-age poverty can be more concentrated in certain regions than in others. One is legacy from the past: those who have spent their adolescent and adult years in environments of relative economic deprivation are economically worse off also in their old age (see, e.g., Glasgow 1993). The other is adverse selection: if the economically developed areas are also more expensive (e.g. in terms of rent), those who are relatively worse off tend to leave them and to move towards cheaper, but also more depressed areas, and there is were we find them, also in their old age.

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 intra country (regional) differences are. SHARE offers a balanced sample of countries in this respect: some are Scandinavian (Denmark and Sweden), some belong to Central Europe (Austria, France, Germany, 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?

Individual Factors

The elderly form a very heterogeneous group, whose economic conditions range from affluence to deprivation (see, e.g., Avramov 2002; Légaré and Martel 2003; 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 do, 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 (Kurz and Blossfeld 2004; Börsch-Supan et al. 2005). 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.

Health, too, may have an impact on the socio-economic status, but the issue is complicate 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 complicate 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.

In short, childlessness—whether voluntary or not—may have crucial effects at the individual level affecting an elder's economic status, other things equal (for an overview, see Plotnick 2007; De Santis et al. 2008). However, the impact of the number of children on the relative economic well-being of the elderly, if any, is ambiguous.

Data Description and Overview

We take our data from the database "Survey of Health, Aging and Retirement in Europe" (SHARE 2.0.1: Börsch-Supan et al. 2005; 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).

Income is expressed in Euros. 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 converted gross into net income by subtracting income tax and employee's social security contributions (SSC)[1] on the basis of OECD estimates of average income tax and SSC rates by household types and earnings. Finally, we transformed this sum into (net) equivalent income by applying an equivalence scale: the square root of the number of household members.

We consider poor those individuals whose net equivalent income lies below the poverty threshold, 60% of the equivalent median net income for each country as calculated from SHARE. This is the poverty line customarily adopted with SHARE (see, e.g., Hallberg 2006) and reveals, with some exceptions, a general North-to-South grouping of countries with respect to poverty (Fig. 1), although our poverty rates do not coincide with those coming from other sources (e.g. Luxemburg Income Study), for two main reasons. One is sample variability; the other is the fact that our average derives from SHARE itself, i.e. is based exclusively on households with at least one relatively old member (aged 50 or over).

Note that our criterion is based on country-specific poverty lines, under the implicit assumption that people compare themselves to their country fellows. There are reasons for considering both narrower 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 changes dramatically. What criterion is preferable—a regional, national, or European poverty line—is unclear, as yet: this study, as mentioned, uses a national poverty line.

[1] SSC have been computed on the basis of the earning of the respondent, while all remaining household income (except imputed rent from owner-occupations) has been taxed at the corresponding average tax rate. Country-specific exemption levels have been taken into account. Imputed rent are assumed to be exempt from to taxation.

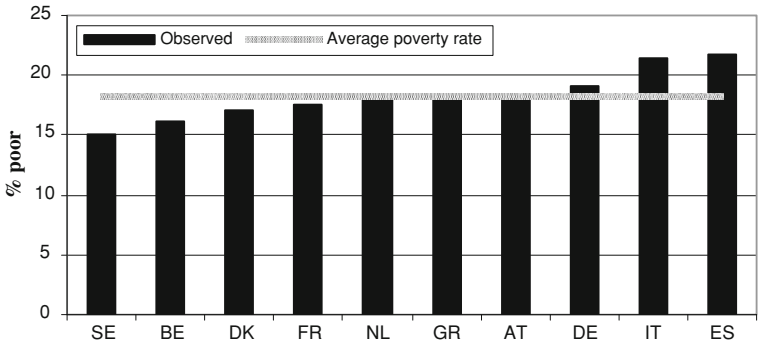

Fig. 1 Percentage of poor elderly after social transfer, 10 EU countries, 2004. *Notes*: Cut-off point for individuals: 60% of median equivalent income after social transfers. *AT* Austria, *BE* Belgium, *CH* Switzerland, *DE* Germany, *DK* Denmark, *ES* Spain, *FR* France, *GR* Greece, *IT* Italy, *NL* the Netherlands, *SE* Sweden. *Source*: Own elaborations on SHARE (2004)

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 poor,[2] and 0 otherwise. Let P_j be the probability that any person from region j be poor. Mathematically, the null model is:

$$y_{ij} = P_j + e_{ij} \tag{1}$$

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 normally distributed P_j probabilities:

[2] Remember that "poor" here means "below the national, arbitrarily drawn poverty line, with reference to the declared income, after convertion into its net, equivalent household income".

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

where the intercept γ 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 τ^2. The null model permits us to test the significance of parameter τ^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. This test shows that the region of residence does influence income poverty, which indicates that multi-level analysis is appropriate.

The second step was to estimate 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 poor, determined as follows:

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

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 1 as well as a few basic descriptive statistics. The model parameters were estimated forwards.

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 times 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.

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).

Table 1 Description of the individual-level covariates, 11 EU nations, 2004, respondents aged 65+

Variables	Abs.	%
Economic difficulty		
No	6,685	82.01
Yes	1,466	17.99
Sex		
Male	3,603	44.2
Female	4,548	55.80
Age classes		
65–69	2,505	30.73
70–74	2,079	25.51
75+	3,567	43.76
Household composition		
Ego alone	3,597	44.13
Couple alone	3,499	42.93
With family/with others	1,055	12.94
Siblings		
0/no siblings alive	1,160	14.23
1	2,053	25.19
2	1,517	18.61
3+	3,421	41.97
Educational level		
Primary education	5,217	64.00
Secondary education	1,833	22.49
Tertiary education	1,101	13.51
Children		
Childless/no living child	1,221	14.98
1	1,488	18.26
2+	5,442	66.76
No. of helps received last year[a]		
0	5,643	69.23
1	1,196	14.67
2+	1,312	16.1
Housing status		
Owner	5,260	64.53
Tenant	2,023	24.82
Rent free/other	868	10.65
Area of building		
A big city	1,245	15.31
Suburbs or outskirts of a big city	1,411	17.35
A large town	1,625	19.99
A small town	2,097	25.79
A rural area or village	1,753	21.56

Table 1 Description of the individual-level covariates, 11 EU nations, 2004, respondents aged 65+

Variables	Abs.	%
Self-perceived help		
Very good	912	11.19
Good	3,175	38.95
Fair	2,966	36.39
Bad	889	10.91
Very bad	209	2.56
Total	8,151	100

Source: Own elaborations on SHARE (2004) data

[a] From outside the household

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. 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 and Bosker 1999), among our macro variables we considered the regional means of a few of our individual variables (variables $\overline{X}_{kj}$), 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). These are: the regional GDP (purchasing power parity per inhabitant); the regional GDP growth rate (the percentage change in comparison to previous year at market price); beds in hospital per 100,000 inhabitants; the unemployment rate; the long-term unemployment rate (i.e., the share of those who have been unemployed for more than 6 months), and the participation of adults aged 25–64 in education and training. A selections of regional indicators is presented in Table 4—Appendix: the general impression that one derives from reading them (and others, not reported here) is that variability is high, not only among nations, but also within them.

Formally:

$$\text{logit}(P_{ij}) = \gamma + \sum_{h=1}^{H} a_h X_{hij} + \sum_{k=1}^{K} b_k \overline{X}_{kj} + \sum_{m=1}^{M} c_m Z_{mj} + U_j; \quad U_j \sim N(0, \tau^2) \qquad (4)$$

Since our paper focuses on the elderly aged 65 or more, contextual covariates that refer to the current situation of the labour market may appear misplaced. However, there is a great degree of persistence in these situations: an unfavourable labour market situation today normally reveals also an unfavourable labour market situation in the preceding years, at a time when our elderly were employed. Besides, our elderly also happen to live with adult relatives whose income is affected by current occupational chances, and this impacts more or less favourably on household income.

For this study we selected 8,151 individuals (65+) nested in 50 regions, belonging to 10 countries (Table 2). Minimum and maximum cluster sizes are,

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	1,091	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
Total	50	8,151	14	910

France and Germany do not have 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 customarily make up France (9) and Germany (17)

Source: Own elaborations on SHARE (2004) data

respectively, 14 and 910, but, fortunately, we need not worry about the unbalanced structure of the SHARE sample, which is efficiently handled by maximum likelihood methods (Snijders and Bosker 1999).

Who are the Poor Older Europeans?

Table 3 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. The results that we obtained, not shown here, differ only marginally from those of Table 3, which therefore appear to be fairly robust.

We expected poverty to rise with age: it does, indeed, but not significantly. Gender, instead, matters, and men's O.R. (odds-ratio) of being poor is about 13% lower than women's. Net of other individual and contextual (regional) covariates, our research hypothesis is confirmed: men are better off than women. However, it is hard to disentangle gender differences from other effects. Men earn more than women in old age, through higher pension benefits, but they also tend to remain married longer, frequently until they die, and living in couple significantly alleviates the risk of poverty (O.R. = 41%, i.e. about 59% less than the standard).[3]

The presence of (adult) children is associated with a lower risk of poverty, but the effect is significant only when one child is there (−21%), and dilutes considerably with two children or more.

[3] We control for current, but not for past marital status or other family characteristics, the effect of which may linger for some time.

Table 3 The correlates of economic difficulties in old age, 10 EU nations, 2004: a logistic multi-level regression model with random intercept

Variable	Categories	Coeff.	OR	Std. error	*z* Value	*p* Value
Sex	*Individual covariates*					
	Female (ref.)	0	1			
	Male	−0.14	0.87	0.0604	−2.24	0.025
	75+ (ref.)	0	1			
Age class	70–74	−0.05	0.95	0.0683	−0.79	0.431
	65–69	−0.08	0.92	0.0685	−1.2	0.231
Household composition	Ego alone (ref.)	0	1			
	Couple alone	−0.89	0.41	0.0691	−12.91	0.000
	With family/with others	0.157	1.17	0.0854	1.84	0.065
Children alive	0/dead (ref.)	0	1			
	1	−0.24	0.79	0.0941	−2.51	0.012
	2+	−0.13	0.87	0.0768	−1.74	0.082
	Primary education (ref.)	0	1			
Education	Secondary education	−0.74	0.48	0.0781	−9.42	0.000
	Tertiary education	−1.01	0.36	0.1032	−9.81	0.000
	Tenant (ref.)	0	1			
Housing	Owner	−0.31	0.74	0.0717	−4.28	0.000
	Rent free/other	−0.02	0.98	0.0951	−0.25	0.805
	Rural area or village (ref.)	0	1			
Area of residence	Small town	−0.38	0.68	0.102	−3.72	0.000
	Large town	−0.27	0.76	0.0939	−2.87	0.004
	Big city suburbs	−0.33	0.72	0.0879	−3.75	0.000
	Big city	−0.16	0.85	0.0812	−2	0.045
	Very good	−0.37	0.69	0.1022	−3.61	0.000
Self-perceived health	Good	−0.22	0.80	0.0631	−3.47	0.001
	Fair (ref.)	0	1			
	Bad	−0.03	0.97	0.0888	−0.32	0.747
	Very bad	0.24	1.27	0.1584	1.5	0.135
	Regional-level covariates					
	Regional GDP	−0.04	0.96	0.071	−0.58	0.564
	Proportion of home ownership	−0.02	0.98	0.007	−2.92	0.004
	Constant	0.93		0.3916	2.37	0.018
	Regional-level variance	0.316		0.0485		
	Log-likelihood	−4562				

Source: Own elaborations on SHARE (2004) data

Education proves, once again, one of the most important predictors of poverty, also among the old. Medium education reduces the odds of poverty by 52%, and high education by as much as 64%.

As expected, the housing situation tells much about how well of an old person fares: home-owners are less frequently poor than tenants (their O.R. declines to

74%). And the place of residence also matters, but in a complex way: poverty is more widespread in rural areas or villages than elsewhere, and it is apparently in small towns that poverty is the least widespread.

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. The estimated model presents a significant regional variance (0.316) that corresponds to an estimated intra-class correlation of 7.37%.[4] So, on the basis of the estimated model, 7.37% of the total unexplained variation in poverty among older Europeans is due to the different region of residence, while the remaining 92.63% is due to individual characteristics.

Only two of our contextual variables preserved their significance within a multivariate model: a larger share of home-owners in the region reduces the proportion of the poor, and so does the regional GDP. This is in line with our interpretation: in those areas where the economic activity is stronger (and GDP higher) personal income is typically higher, both labour income (not directly shown here, but remember that it is household income that we are using as a dependent variable) and pension income—i.e. the kind of income that is most important for our subsample (people aged 65 and over). Home-ownership is more frequent where people are well rooted in their territory, which also normally implies better quality of local services, greater social integration of the whole community and, therefore, fewer cases of extreme deprivation. Other second-level covariates (e.g. regional GDP growth rate; beds in hospitals per 100,000 inhabitants, and long-term unemployment rate), significant when treated alone, lost their significance when used in combination with others, because of collinearity.

Figure 2 shows the predicted probabilities of being poor for selected hypothetical individuals. The baseline is a person at great risk of poverty, as results from our individual parameter estimates. The figure shows that the most effective *individual* variable in reducing 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 3 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 most relevant findings: the South in Italy, Spain and Belgium, and southern and eastern Germany are the areas where (relative) poverty risks are highest.

Regional and national differences can also be analyzed by looking at the predicted random effects (empirical Bayes residuals) of the model (Rabe-Hesketh et al. 2004). A full discussion of the theory of empirical Bayes estimation is beyond the scope of this paper. Let us simply say that the empirical Bayes predictions reflect all the regional-level factors that have not been explicitly considered: regions with

[4] The intra-class correlation is computed following the standard practice: $\frac{\tau^2}{\tau^2+\pi^2/3}$ (Snijders and Bosker 1999).

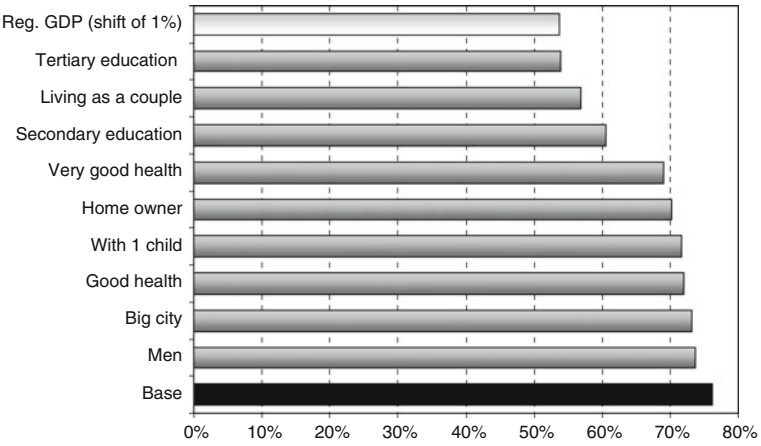

Fig. 2 Predicted probability of being poor after social transfer in old age in Europe: base (worst) case and alternative scenarios. Elaborations on the results of the logistic multi-level regression model shown in Table 3. *Notes*: Base = female, living alone, without living children, with primary education, tenant, living in a rural area or village, perceiving her own health status as very bad. The change in the regional GDP is of 1%. Reading: *ceteris paribus*, women with tertiary education, for example, have lower probabilities of being economically poor than the baseline: little more than 50%, as opposed to about 76%

high, positive or negative, residuals reveal a poverty risk that is "unexpected", given the estimates of our model. Positive values reveal the presence of unobserved contextual factors that increase the risk of poverty, and the reverse is true for negative values. For the fitted model, the standardized empirical Bayes residuals at national and regional level are presented in Figs. 4 and 5.

At the national level, poverty is significantly (at least one standard deviation) higher than expected for Denmark, Germany, Greece, and Spain, and it is significantly lower for and Italy and France (Fig. 4). However, working at the regional level reveals a (partly) different story.

The logic of Fig. 5 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 the rest of the country is roughly as poor as the model predicts (given all the other covariates it considers). 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, whereas in the Islands of Sicily and Sardinia the opposite is true, and poverty is more widespread than theoretically expected. At the other extreme, not all of Germany performs poorly; this is only true of a few regions: e.g. Mecklenburg-Vorpommern (in the north-east), Hessen (center) and Bavaria (South-East).

Discussion

The risk of being relatively poor varies considerably among the aged. Starting from individual-level factors, we found that education is one of the most important

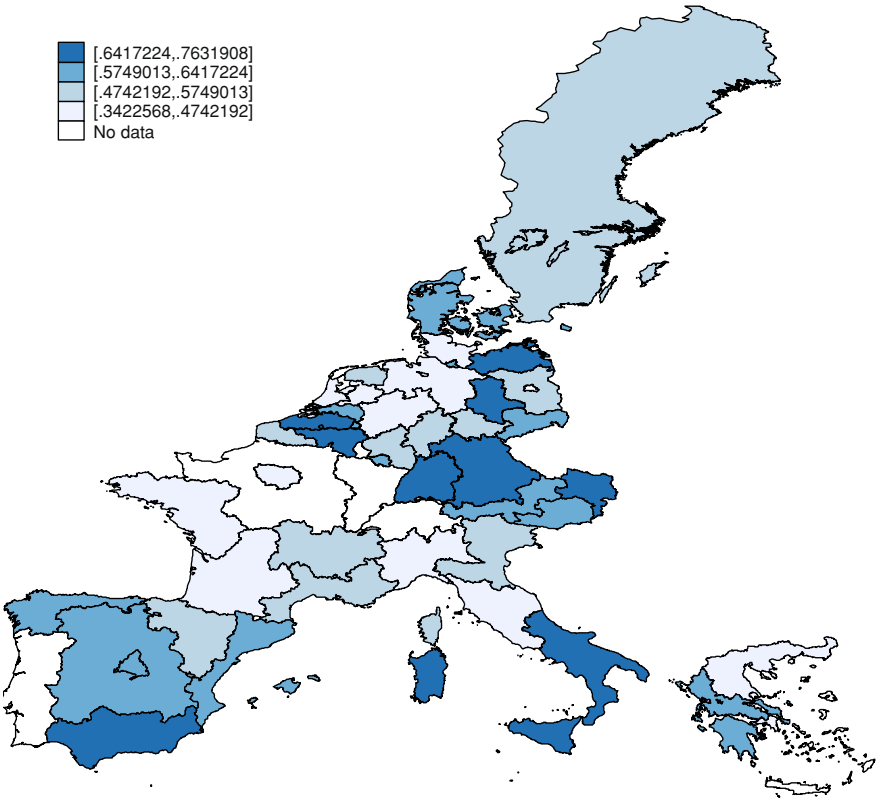

Fig. 3 Predicted probabilities of being poor, per region of residence. Individuals aged 65 or more, in 10 EU Nations in 2004. Elaborations on the results of the logistic multi-level regression model shown in Table 3. *Note*: Classes are formed through the quartiles method

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 number of other factors: for instance, greater propensity to save, ability in managing one's savings, better health, good connections, etc. Since education levels are on the rise, on average, prospects may appear to be good for the aged of tomorrow.

Other elements, however, push in the opposite direction. Take living arrangements, for instance: co-residence with a partner alleviates the risk of poverty, by multiplying sources of income. Forecasts on the living conditions of the elderly in Europe indicate that while in the near future things could even "improve" for a while (lower mortality makes widowhood rarer), in the longer run opposite forces might prevail (more frequent union dissolution, childlessness, etc.): the chances of spending alone several of the final years of one's life are therefore not trivial, especially for women (Gaymu et al. 2008).

The risk of being poor is also influenced by contextual variables, which actually appear to be perhaps as important as, if not more important than, individual

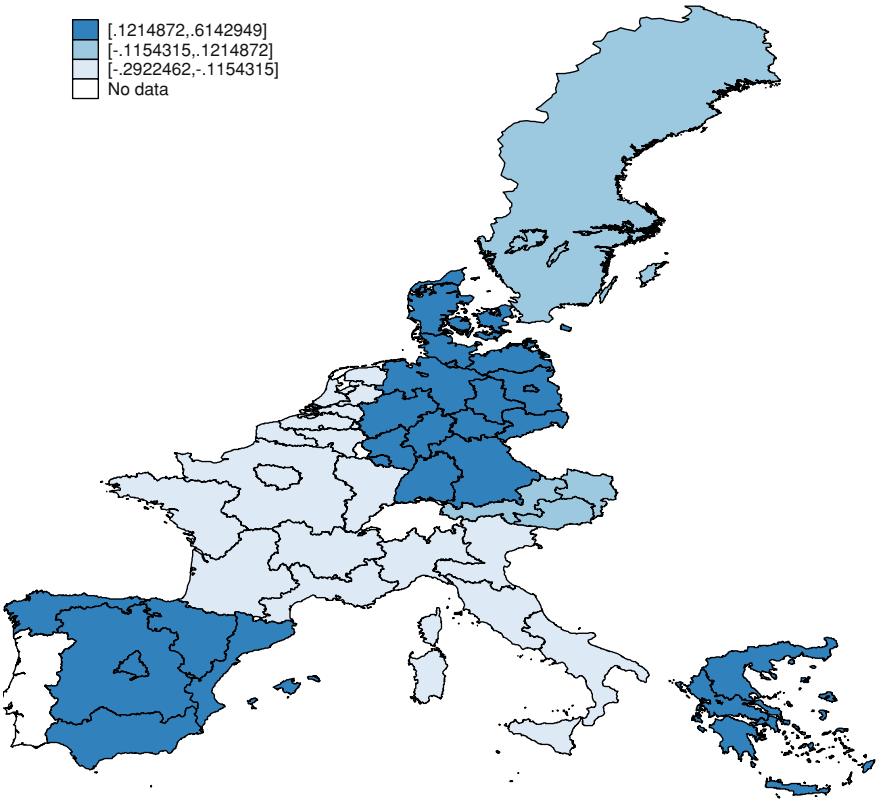

Fig. 4 National standardized empirical Bayes residuals from the fitted model. Individuals aged 65 or more, in 10 EU Nations, in 2004. Elaborations on the results of the logistic multi-level regression model shown in Table 3. *Note*: Class intervals are centered on the arithmetic mean. The central class 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

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, which also exists: poverty appears also significantly influenced by the specific context of residence.

Regional variability in income poverty appears to be important, so much that the existence of the three or four archetypical welfare-state models—*á la* Esping-Andersen (1990, 1999, 2003)—may be questioned. Moreover, within nations, the economic divide does not always follow simple north-south or east-west gradients.

Identifying poor older Europeans and understanding the factors associated to their vulnerability represents a pivotal task for social policy. What this study suggest is that aggregated, national-level data mask sub-national variation in economic difficulties among the elderly. This has, among others, a policy implication: if poverty is more concentrated in some areas of a country than in others, geographic targeting may be important in trying to fight it and so alleviate future monetary

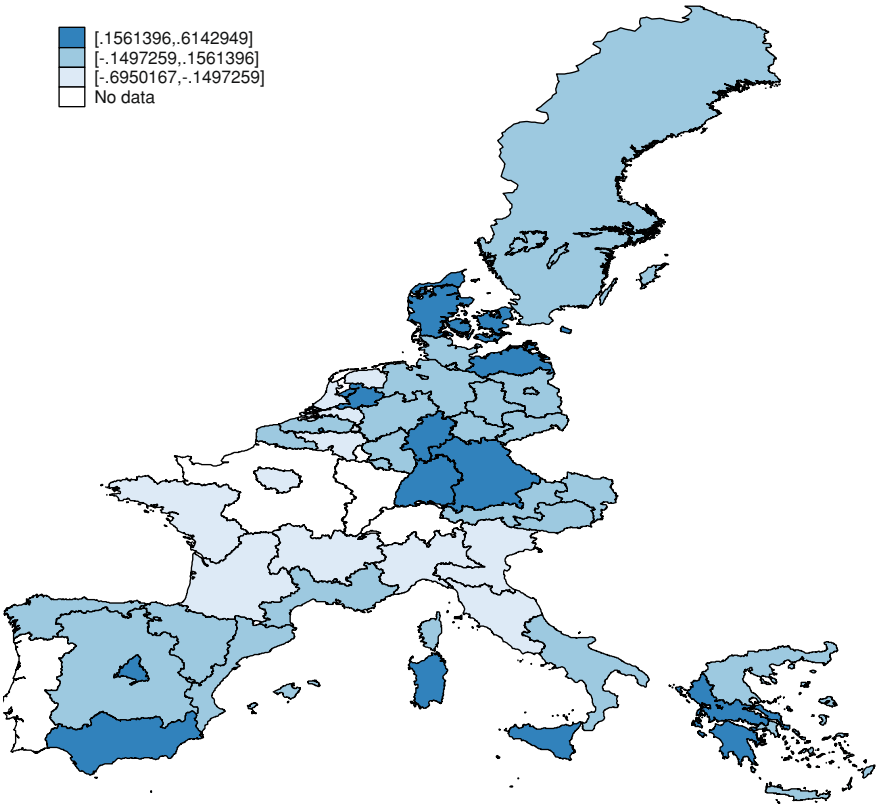

Fig. 5 Regional standardized empirical Bayes residuals from the fitted model. Individuals aged 65 or more, in 10 EU Nations, in 2004. Elaborations on the results of the logistic multi-level regression model shown in Table 3. *Note*: Class intervals are centered on the arithmetic mean. The central class 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

poverty among the aged, for instance giving priority to social spending and infrastructural investments in selected localities.

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Appendix

See Table 4.

Table 4 Regional overview of NUTS 1 characteristics, 2004

NUTS 1 regions	GDP at current market price (millions of euro)	Real growth rate of regional GDP at market prices—% change on previous year	Available beds in hospitals (Per 100,000 inhabitants)—2003	Unemployment rate	Long-term unemployment rate—% of people unemployed for more than 6 months	Participation in life-long learning—participation of adults aged 25–64 in education and training (per 1000 inhabitants)
Ostösterreich (AT)	110559	2	891.3	6.3	31.62	265.1
Südösterreich (AT)	45039	3.3	876.1	4.1	23.69	118.3
Westösterreich (AT)	89732	2.6	745.5	3.3	20.51	211.6
Région de Bruxelles (BE)	57948	1.4	942.6	17.6	56.12	58.1
Vlaams Gewest (BE)	173169	2.5	762.8	5	42.24	275.5
Région Wallonne (BE)	70849	2.8	683.6	11.7	56.25	92.7
Baden-Württemberg (DE)	326417	0.5	899.8	6.3	48.78	488.3
Bayern (DE)	399091	2.4	948.7	6.5	48.02	484.7
Berlin (DE)	78989	−0.7	640.7	18.7	63.89	216.8
Bremen (DE)	24624	1.5	839.5	16.5	61.72	105
Hamburg	83072	0.4	925	14.4	57.74	31.5
Hessen	200897	1.5	724.2	9.8	51.92	101.6
Mecklenburg-Vorpommern (DE)	31721	0.8	951.4	8.1	53.59	283.2
Niedersachsen (DE)	191573	1.4	1233.4	19.2	60.84	66.5
Nordrhein-Westfalen (DE)	487905	0.9	836.5	9.7	56.73	285.1
Düsseldorf (DE)	158919	0.9	858	9.8	54.79	657.3
Rheinland-Pfalz (DE)	97945	2.4	863.5	8	51.69	146.1
Saarland (DE)	27448	3.2	1011.2	9.5	54.48	42.5
Sachsen (DE)	85280	2	872.4	16.6	62.36	164.5
Sachsen-Anhalt (DE)	48292	1.4	830.3	17.8	65.11	90.7

Table 4 continued

NUTS 1 regions	GDP at current market price (millions of euro)	Real growth rate of regional GDP at market prices—% change on previous year	Available beds in hospitals (Per 100,000 inhabitants)—2003	Unemployment rate	Long-term unemployment rate—% of people unemployed for more than 6 months	Participation in life-long learning—participation of adults aged 25–64 in education and training (per 1000 inhabitants)
Schleswig-Holstein (DE)	68644	1.6	985	9	52.62	122.3
Thüringen (DE)	44558	1.7	972.5	15.6	61.27	93.8
Denmark (DK)	207756	2.1	412.8	3.9	20.82	861.8
Noroeste (ES)	77225	3.1	366.7	8.4	27.98	249.8
Noreste (ES)	105925	3	395.4	6.3	22.32	295.2
Comunidad de Madrid (ES)	160046	3.5	335.7	6.4	18.76	410
Centro (ES)	95083	3.5	362.7	9.3	23.06	292.2
Este (ES)	280955	3	389.1	7.2	18.22	733.1
Sur (ES)	152450	3.6	285.8	12	23.26	499.1
Canarias (ES)	36766	2.5	448.1	11.7	21.55	123.3
Île de France (FR)	482608	1.2	689.1	9.4	46.99	449.2
Bassin Parisien (FR)	253330	3.2	776.7	8.8	40.38	394.4
Nord—Pas-de-Calais (FR)	87391	1.7	691.2	12.9	48.27	150.6
Est (FR)	126586	2.4	865.4	8.4	40.22	219.3
Ouest (FR)	199408	3.6	815.6	7.6	34.56	354.6
Sud-Ouest (FR)	160116	2.6	865.9	8.2	40.05	269.5
Centre-Est (FR)	195573	2.6	863.4	7.8	36.69	300.9
Méditerranée (FR)	183701	2.7	873	11.9	47.7	233.2
French overseas departments (FR)	29208	2.2	513.9	27	76.1	–
Voreia Ellada (GR)	49181	3.7	469.7	9.7	56.8	33.5

Table 4 continued

NUTS 1 regions	GDP at current market price (millions of euro)	Real growth rate of regional GDP at market prices—% change on previous year	Available beds in hospitals (Per 100,000 inhabitants)—2003	Unemployment rate	Long-term unemployment rate—% of people unemployed for more than 6 months	Participation in life-long learning—participation of adults aged 25–64 in education and training (per 1000 inhabitants)
Kentriki Ellada (GR)	35462	2.9	301.4	9.2	56.15	14.5
Attiki (GR)	97001	3.7	588.5	8.3	54.83	59.5
Nisia Aigaiou, Kriti (GR)	16966	3.8	419.9	7.9	37.9	6.7
Nord Ovest (IT)	456991	0.8	456.1	3.9	39.1	508.5
Nord Est (IT)	321181	1	466	3.6	31.8	416.5
Centro (IT)	308819	2.5	448.2	6.1	46.58	450.3
Sud (IT)	227042	0.5	499.9	12	57.32	419.2
Isole (IT)	109015	−0.7	389	12.7	58.25	200.2
Noord-Nederland (NL)	50422	1.5	409.8	4.6	42.71	131.7
Oost-Nederland (NL)	90335	2	487	3.7	45.32	265.4
West-Nederland (NL)	261107	2	425.3	3.9	41.32	724.5
Zuid-Nederland (NL)	107100	1.4	472.3	3.7	45.03	282.5
Sweden (SE)	294674	4.1	358.5	7.1	15.15	884.6

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

Source: http://epp.eurostat.ec.europa.eu

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