INCOME AND HEALTH REVISITED: THE INTENSITY AND PERSISTENCE DIMENSIONS

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Abstract

That poverty is bad for health is a well-known fact. When we take time into consideration, the more often the individual is in poverty the worse is the health outcome, as evidence shows. This paper aims to deepen the analysis by introducing two additional less-considered aspects of poverty over time: its intensity, that is the shortfall from the poverty line, and its persistence, the degree to which poverty episodes are consecutive. Using European Community Household Panel data we first confirm the existing findings for a range of EU countries. We are also able to show that recurrent poverty is more harmful for health than isolated episodes of low income, conditional on total poverty exposure.

Key words: Income, Poverty, Health, ECHP.
JEL Classification Codes: I30, D60.

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1. Introduction

Although it is widely recognized that poverty is bad for health (see, for example, Marmot and Wilkinson, 2006, OECD, 2003), the characteristics of poverty which are more harmful are still debated. The literature on poverty measurement has stressed forcefully that poverty is a complex phenomenon and has summarized the dimensions of poverty as its three I's: incidence, intensity and inequality. Incidence focuses only on the event of poverty; intensity includes the evaluation of the income shortfall from the poverty line; inequality considers the dispersion in the distribution of income among the poor. Together with the three I's, some recent contributions (for an extensive survey see Gradín et al., 2011) have proposed to include time directly into the measurement of poverty.

From an individual's perspective, the poverty line is a given number set from the outside. When poverty is measured only by its incidence all poor individuals are treated equally and receive the same weight in the index. The best-known index, the headcount ratio, is an example of this as it is equal to the share of the poor population. Hence, in focusing only on poverty incidence, it is implicitly assumed that what matters for understanding the effects of poverty on health is simply the fact that an individual is poor. In this case, what harms health is the shock of being poor, the shame and the stress caused, for example, by a job loss (see Bartley et al., 2006, for a review of this topic).

Intensity of poverty, on the other hand, considers information on the degree of poorness of the individuals. An index of poverty in this case assigns less weight to the poor who are closer to the poverty line than to those who are even poorer. The reason is that the former will have higher chances of conducting a decent life than the latter. When we test the effects of the intensity of poverty on health we consider also to the consequences of the income shortage on health. It is bad nutrition, poor quality of housing, insufficient quantity and inappropriate quality of the medical services an individual has access to which harm health.

Similar reasoning holds for persistency in a state of poverty. We distinguish the situation in which periods of poverty are interrupted by better times as opposed to being in poverty in consecutive periods. "Individuals who have been persistently poor are often discriminated against and have little access to productive assets and low capabilities in terms of health, education and social capital" (Chronic Poverty Research Centre, 2004, p.3). Persistence of poverty may have consequences on the heath status of the individual. As discussed above for snap-shot poverty, we may choose to measure persistent poverty by considering the depth of individual poverty or by not taking this aspect into account.

When we include information on the depth of poverty, for example, the poorer an individual is the worse his expected health status. A poor individual may not be able to eat properly in a first period affecting his health negatively. The impact of malnutrition in the next period will worsen the already weakened health status of that individual still further and so on for consecutive periods of malnutrition.

When we do not distinguish poor individuals based on their income shortfall and focus on the events of poverty, two opposite effects on health are to be expected. On the one hand, we may think that an individual gets accustomed to being in poverty; for example, an individual after being for some periods in unemployment feels no shame anymore for it. On the other hand, this adaptation can also not occur and persistent states in poverty exclude the individual from the society he lives in harming his health.

The aim of the present study is to evaluate the effects of income on health with an appropriate consideration of the multi-faceted aspects of poverty described above. We focus on the role of time and persistence in poverty. The most important contribution to the literature is methodological. The main idea is that by choosing the appropriate indices from the income distribution literature, it is possible to test the consequences of different *types* and *aspects* of poverty on health.

Throughout the study, we assume that time matters for both poverty and health. Obviously, other studies in the health literature have investigated the role of time spent in poverty. The great majority of papers on socio-economic determinants of health measure poverty by looking only at its first I: the incidence of poverty. The same practice is followed by the literature investigating the relationship between income over time and health. Benzeval and Judge (2001), the contribution most similar in spirit to ours, have summarized the modalities through which time has been incorporated into studies on the topic. They report that time appears as long-term income, that is the mean income over the periods, income change from one period to the next, and poverty duration. To the best of our knowledge, no consideration is given to the intensity of poverty or to the consecutiveness of the years spent in poverty by using theoretically sound indices.

Our analysis extends the findings for the UK of Benzeval and Judge (2001) in two dimensions. First, we introduce both the time sequence and the intensity in measuring poverty. Second, we perform a longitudinal analysis at the European level, using the European Community Household Panel (ECHP), which covers most of the EU15 member states from 1994 to 2001.

There are various advantages from using this dataset. Since for both the UK and (West) Germany related evidence is available from other studies, we have a strong reference point to start from (for Germany see the papers surveyed in Benzeval and Judge, 2001). In addition, this dataset has been widely used in many different studies and it is considered reliable. Lastly, by extending the analysis to

the European level, our study confirms the previous evidence available only at a single country level. In this sense, the robustness of our results shows that this line of investigation might be particularly fruitful also for future analyses.

The paper is organized as follows. We present the formal framework of poverty measurement in Section 2. The dataset is described in Section 3 with descriptive statistics left to Section 4. In Section 5 we introduce the empirical strategy followed while the results are contained in Section 6. Section 7 concludes.

2. Measuring poverty

The seminal contribution on measuring poverty is due to Sen (1976). He distinguishes two fundamental issues in poverty measurement, namely, (i) identifying the poor among the total population; and (ii) constructing an index of poverty using the available information on the poor. The first problem has been solved in the literature by setting a poverty line and identifying as poor the individuals whose incomes fall below this threshold. Regarding the second, the aggregation problem, many indices have been proposed capturing not only the fraction of the population which is poor (the headcount ration), that is, the incidence of poverty, but also the extent of individual poverty and the inequality among those who are poor.

The most popular class of indices has been proposed by Foster, Greer and Thorbecke (1984) and is known as the *FGT* indices. Let $x = (x_1, x_2, ..x_n)$ be the distribution of income among n individuals, where $x_i \geq 0$ is the income of individual i. For expositional convenience we assume that the income distribution is non-decreasingly ranked, that is, for all x, $x_1 \leq x_2 \leq .... \leq x_n$. We indicate the poverty line by z. For any income distribution x, person i is said to be poor if $x_i < z$. Assume that there are q poor persons in the society. Let $d_i = \frac{z - x_i}{z}$ be the normalized deprivation of poor person i with respect to z, that is, the relative shortfall from the poverty line, where $1 \leq i \leq q$. For $q < i \leq n$, d_i is equal to zero. Then the *FGT* indices are:

$$FGT^{\alpha} = \frac{1}{n}\sum_{i=1}^{q}(d_i)^{\alpha}, \qquad [1]$$

where $\alpha \geq 0$ is a parameter.When α=0, the *FGT* is equal to the headcount ratio. The only dimension of poverty which is considered in this case is the incidence, since it measures the part of the population

which is poor. When α=1, the *FGT* looks also at the intensity of poverty as the index is now an average of the relative shortfalls. The parameter α can be interpreted as the degree of aversion to inequality.

The literature on poverty measurement has advanced to a high degree of sophistication since Sen (1976). However, only recently some measures of intertemporal poverty have been proposed as opposed to indices limiting attention to single-period considerations.

There are several approaches to the measurement of poverty over time. Without going into specifics, it may be useful to distinguish our notion of *persistence of poverty* from what we think of as being in *chronic poverty*. Generally speaking, we think of chronic poverty as a term to apply to situations in which an individual is in a state of poverty for a large total proportion of the number of time periods under consideration. This does not necessarily mean that attention is paid to the durations of poverty spells given a total number of periods spent in poverty. Our notion of persistence explicitly takes the duration of these spells into consideration. In other words, chronic poverty occurs when there is a frequent recurrence of poverty states while persistent poverty requires in addition to frequency that poverty manifests itself in periods that are consecutive.

Both Benzeval and Judge (2001) and some of the papers surveyed there use measures of chronic poverty, for example, the number of the years spent in poverty. We indicate the latter index by Y_i^P. To incorporate information on the intensity of poverty and its recurrence, we apply the indices of persistent poverty proposed by Bossert, Chakravarty and D'Ambrosio (2011).

Let d_i^t be the normalized deprivation of poor person *i* in period *t*. The normalized deprivations are raised to the power $\alpha \in \{0,1\}$ and are collected in a *T*-dimensional vector. When α=0, the vector is a list of ones and zeros, where a one represents a period in poverty and zero a period out of poverty. For example (1,1,1,0,1) indicates that the individual has spent the first three periods in poverty, one period out of poverty and then back in poverty in the last period. The first spell of poverty has length 3 while the last has length 1. When α=0, the index captures the incidence of persistent poverty.

Examples of situations with α=1 are ((1/3),(1/2),(1/4),(1/2),0) and ((1/3),0,(1/2),(1/4),(1/2)). In the first case the individual experiences one spell of poverty of length 4 and is out of poverty in the 5^{th} period. In the second case the individual faces poverty in two separate spells, the first of length 1, and the second of length 3. He is out of poverty for one period in between the two spells. When α=1 the index captures the incidence and intensity of persistent poverty.

The indices proposed by Bossert, Chakravarty and D'Ambrosio (2011) to give importance to persistence weigh each spell by its length, *l*. The index is the weighted average of the individual

normalized deprivation where, for each period, the weight is given by the length of the spell to which this period belongs:

$$BCD_i^{\alpha} = \frac{1}{T}\sum_{t=1}^{T} l^t \left(d_i^t\right)^{\alpha},$$

where $\alpha \geq 0$ is a parameter.

For the first example, (1,1,1,0,1), the index is $BCD_i^0 = \frac{1}{5}\left(3\left(1+1+1\right)+0\cdot 1+1\cdot 1\right) = \frac{10}{5}$. For the second example, ((1/3),(1/2),(1/4),(1/2),0), the index is $BCD_i^1 = \frac{1}{5}\left(4\left(1/3+1/2+1/4+1/2\right)+0\cdot 1\right) = \frac{19}{15}$ While in the last example ((1/3),0,(1/2),(1/4),(1/2)), the index is equal to $BCD_i^1 = \frac{1}{5}\left(1\left(1/3\right)+0*1+3\left(1/2+1/4+1/2\right)\right) = \frac{49}{60}$.

3. The data

The European Community Household Panel (ECHP) is the only European level panel survey including good measures of both income and health. Data are collected through surveys that cover a wide range of topics concerning living conditions. The total duration of the ECHP was 8 years, running from 1994-2001 (8 waves). Since time represents an important variable for our purposes, we confine the analysis only to individuals who were observed for the entire 8 years. Obviously, this sample selection introduces a potential bias, since people that dropped out might have done so for reasons that are correlated to either health or income. This attrition problem, however important, is ignored in this context because our focus on the persistence of poverty requires a long enough period of observation. Eight years represents, we believe, a minimum period for observing any relevant effect and providing enough variability. Moreover, since the entire sample has been observed for 8 years, persistence measures are uniform across countries and families, implying that the time of exposure does not have an effect on the results.

The survey reports total household annual income, which is then equivalized using the OECD equivalence scale and corrected for both country inflation and Purchasing Power Parity according to the information provided by Eurostat. This transformed income is comparable across countries, individuals and time. As the dataset refers to European countries in the nineties, a concept of relative, rather than absolute, poverty is used for the analysis. Most of the literature on measuring poverty in Europe agrees on defining an individual in relative poverty if his income is below the threshold (z)

equal to 60% of the country/year median income. We indicate a poor individual with a dummy variable ($poor_{it}$) which is 1 if individual *i* possess an income in year *t* below *z*.

Although many questions have been raised regarding its actual reliability (see, among others, Crossley and Kennedy, 2002), it is well known that self-assessed health (*sah*) is a good predictor of mortality and morbidity in a variety of situations (see Jylhä, 2009, DeSalvo et al., 2006, and Burstrom and Fredlund, 2001). Specifically, within the analysis conducted on ECHP, *sah* represents the most widely used measure of health (see, for example, Karlsson et al., 2010, Kennedy et al., 1998). We follow this approach and *sah* is the dependent variable in the analysis. The relevant question we refer to is: "How is your general health?". In the survey, adults answer on a discrete 1 to 5 scale, where 5 is the worst condition (very bad) and 1 is the best (very good). To help the interpretation of the results, however, we redefined the scale so that in our dataset 1 corresponds to very bad health and 5 to very good. Hence, indicating by sah_{it} the health of individual *i* in time *t*, person *j* is in better health than person *i* if $sah_{jt} > sah_{it}$.

4. Descriptive statistics

The main socio-demographic characteristics of the sample are reported in Table 1. Average income is around €10,000 in 1994 and increases to €12,000 in 2001. As the data are adjusted for inflation rates, this should represent a real increase in income in the period of observation. On the contrary, average health has slightly decreased. Average age must increase by one from one year to the next since the sample is a balanced panel. Part of the decrease in the average values of health must be due to this natural ageing process, which shows the importance of controlling for age in the regressions. Moreover, the within sample percentage of retired people steadily increases from 17% of the sample in 1994 to 24% in 2001.

TABLE 1 HERE

The within sample proportion of unemployed decreases with time and is relatively low from the beginning (6%). However, it should be stressed that these values cannot be directly compared with the official figures of unemployment rates as published, for example, by Eurostat, since in that case the proportion is calculated over a different (and smaller) denominator, that is on the sum of employed and

unemployed only. The number of poor and inactive remains basically the same across the 8 waves. This suggests that poverty persistence might be a relevant phenomenon.

TABLE 2 HERE

Table 2 shows the number of observations and the percentage of people that are classified as poor in 2001 together with the "never poor" and "always poor". Two main points are worth highlighting.

First, countries differ substantially in terms of poverty profiles. Denmark, the Netherlands and Germany are characterized by low poverty rates and low poverty persistence (the "never poor" are around 70%). On the contrary, Portugal and Greece show both high poverty rates and high persistence. Belgium, France, Ireland, Italy and Spain have very similar average values of "years in poverty". However, Belgium and France are in a better position since the category of the "never poor" is higher. These considerations suggest that European countries can be aggregated in either three or four clusters in terms of poverty profiles.

Second, the number of within country observations under persistent poverty is very low, particularly in northern European countries. For example, in Denmark only the 1% of the sample is categorized as "always poor". The only outlier in this respect is Portugal, where the same category reaches the top value of 9%. In general, however, numbers, and thus variability, are insufficient if we want to identify a relationship between poverty persistence and health at the country level, especially considering that further controls like age and actual poverty status must be introduced.

The three indices described above are calculated: Y_i^P, BCD_i^0 and BCD_i^1. Their distribution across time is reported in Table 3. Clearly, in 2001, the last year in the survey, someone could have been poor for a maximum of 8 years and the sequence of the states in poverty is always the same. Hence Y_i^P and BCD_i^0 must have the same minimum and maximum values. Similarly, since the maximum relative poverty gap equals 1, BCD_i^1 ranges between 0 and 1.

TABLE 3 ABOUT HERE

5. The empirical strategy

The longitudinal dimension of the dataset represents an important value added for the study. It allows to measure poverty persistence as described above. In addition, it makes it possible to exploit the

individual within variation in the self-assessed health status. This is important since the levels of sah_i might be sensible to cross-section heterogeneity due, for example, to individuals attributing different values to the same health status. However, if the same individual evaluates his end-of-survey health status as higher in terms of sah_i, we can reasonably assume that he is now better off no matter what the initial level of the same variable is. Controlling for within variation can thus help us solving part of the individual heterogeneity problem related to the subjective evaluations of the health functioning.

The relation between income and health is investigated by using two different but related models. First, we run a cross-section Probit on $1[sah_{i1}>sah_{i8}]$ (that is, when individual health worsened in the years under analysis). Note that for Germany *sah* is available only since 1995, so that in this case the dependent variable is on $1[sah_{i2}>sah_{i8}]$. Since "very bad" starting values cannot worsen, this analysis is performed only on the sub-sample of people whose health in 1994 was in the "fair" to "very good" intervals ($sah_{i1} >2$). Consequently, individual sah_i at the beginning of the observation period is a reference to "rescale" health in 2001. The respondents in 1994 could be in bad health for many reasons, including pre-1994 poverty. As we cannot observe profiles before 1994, selecting only people with $sah>2$ in 1994 allows us to homogenize the sample and to drop cases that are difficult to interpret.

In the second approach we run a panel Probit on $1[sah_{it}<3]$ (that is, an indicator variable which equals 1 when observation *i* at time *t* is in relatively bad (<3) health). In order to observe an impact related to the time dimension, we focus on the period 1997-2001, so that at the starting point each individual has already a history of three years of potential poverty. This approach relies on a wider dataset and can exploit more variation in sah_i as we use 5 observations for each person interviewed in the sample. Note however that we control for initial values of sah_i which are available for each respondent. We consider the case of "bad health" because, as specified above, there seems to be a close correspondence between low values of sah_i and mortality/morbidity rates.

The main focus of the paper is to apply poverty indices in order to understand the relationship between poverty, time and health. For this purpose we use as independent variables Y_i^P, BCD_i^0, and BCD_i^1. For the first model (Probit on 2001 observations) these indices can all vary from 0 to 8 according to the individual poverty patterns. In the second model (Panel probit on 1997-2001), past patterns must be calculated for each year and the value of the indices varies with the wave considered (see Table 3). Since these three indices capture different dimensions of poverty profiles, their use in different combinations can help us understanding the role of these dimensions in the relationship with health outcomes. For example, if Y_i^P is significantly (and positively) correlated to the probability of having a

bad health, but BCD_i^1 is not, then this would signal that the time dimension as chronicity is important but that intensity does not have any explanatory power once past periods in poverty are considered in the analysis.

Given the low numbers of persistently poor within countries, a multilevel analysis based on the overall cross-European sample suites our data best. Hence, both models (Probit and Panel Probit) are estimated on the general sample, while country dummies are used to take into account average country differences. This method allows us to exploit the larger overall numbers in the persistently poor while contemporaneously controlling for both within country and within individual variation. Estimation is performed through Maximum Likelihood.

Control variables play a crucial role, especially the socio-demographic characteristics of the individuals. The controls used are reported in the descriptive Table 1. Clearly, age, sex, education and employment status are important characteristics affecting sah_i. In addition to these classical stratification variables, we also consider three quantities. First, as explained above, the sah_i at the beginning of the observation period. Since the relationship between income and health can move in both directions, the issue of reverse causality cannot be ruled out a priori. Potentially, it can be that someone is poor because of bad health. Of course, given the objective of the study, the real trigger of the process is less important, as we are interested in the long run impact of poverty. However, controlling for initial health status allows us to reduce the possible bias by performing the analysis on respondents that were in similar health at the beginning of the period. The second important covariate is the starting income. Although poverty measures should capture the non linear nature of the impact of income on health, income still represents a good control because it affects health at any level, not only through a distinction between poor and not poor. Third, we introduce the dummy $poor_{it}$ described in the data section. By using this variable we want to isolate the effect of past poverty events from the impact of being poor in a given year. Results should then reflect the impact of poverty profiles independently from the actual poverty status.

6. The results

The results from the simple Probit model are reported in Table 4, where we consider eight different models according to the combination of the poverty measures used in the regressions. Let us restate that we are calculating the probability of worsening health status between 1994 and 2001 given the

absence of serious health problems in 1994. The sample is a cross-section of respondents. Country dummies are used and are always significant.

The first robust result is that past poverty profiles matter, however measured. They are always very significant and increase the probability of worsening health. This implies that, on average and controlling for all the relevant covariates, there are more respondents whose sah_i decreased among the chronically poor than among the people who have been never or rarely poor. This result, which does not depend on the model specification (it can be replicated in other models too), is in line with the existing evidence at the country-level and shows that chronic poverty matters also at the European level.

Even though the coefficients of the three indices of poverty are significant and positive, (see the first three columns of Table 4) we cannot conclude that time and persistence in poverty is a relevant dimension for health. Indices can be correlated to health simply because someone who is poor is in bad health. In order to isolate the role of time we need to consider these indices together with the poor dummy. Results are contained in models 4-6. As expected, the value of the coefficients of the three indices is lower when this additional poverty variable is included, but changes are not substantial. Hence we are now able to claim that the time dimension of poverty matters.

Y_i^P is the number of years spent in poverty by the individual. It is a measure of chronic poverty without considering persistence, included in BCD_i^0 and BCD_i^1. BCD_i^0 does take into account the sequence of the poverty episodes. Adding BCD_i^0 to a regression with Y_i^P should inform us if persistence plays a role beyond the simple count of the years in poverty. Similarly, using BCD_i^1 should signal the relevance of the intensity dimension of persistent poverty. In both cases, however, there is no evidence that respondents with similar Y_i^P but different persistence profiles are associated to different health status. The third result of this paper is that chronic poverty matters while persistent poverty, however measured, does not influence any further health among Europeans.

TABLE 4 HERE

Another way to control for individual heterogeneity is to use panel data techniques. Results for the Panel Probit are reported in Table 5. In this case it should be noted that the poor dummy seems to have more impact on the dependent variable (models 4-6) than in the Probit analysis. This is probably because in this setting this variable changes by year and can thus be more precise and more easily

correlated to changing values of sah_i. Nevertheless, the importance of past values in explaining health status remains robust and strong. Our general conclusions are thus confirmed: poverty reduces health and the time dimension is relevant and significant. Persistence here is relatively more important (model 7), indicating that when someone is poor for a few years, the sequence of the poverty profiles might matter. However, since this result is not replicated when the probability of getting worse is considered, its robustness should be questioned. On the other hand, intensity and persistence poverty do not have any impact, no matter the model considered.

TABLES 5 and 6 HERE

Table 6 reports how average health decreases when Y_i^P increases. Average values for the first column are the predictions of sah_i based on simple linear regressions where we included the whole set of controls plus a set of dummies, one for each value of the number of years spent in poverty (1 to 8). Calculations for the last two columns are based on model 1 of Table 4 and 5 respectively, with the only difference that now one dummy indicator for each value of Y_i^P is introduced. This allows us to differentiate the average levels across different values of Y_i^P.

Whatever measure is considered, health decreases with the number of years spent in poverty. This pattern is weak at the beginning, for low values of past poverty, but strengthens significantly with the persistence of poverty. Overall, the trend is clear: sah_i decreases with an increase in poverty persistence. For example, an "always poor" is almost nine times more likely to have worse health in 2001 (as compared to 1994) than someone who is poor only in 2001. Similar values are obtained when considering the probability of being in a bad health state. Considering that in 1994 these two hypothetical respondents were similar in terms of sah_i, the impact of chronic poverty seems rather strong. Interestingly, Y_i^P does not affect health linearly. Looking at Table 6, three clusters are identifiable: respondents who have been poor between 1 and 3 times; respondents who have been poor between 4 and 6 years; respondents who have been poor more than 7 times.

7. Discussion

It has been known for long that poor individuals generally have lower health states. This empirical regularity is so well-known that it can be somehow considered as a stylized fact. The mechanisms

through which relative poverty and inequality affect health are, however, still debated and no consensus has been reached yet. The understanding of these mechanisms is incrementally refined in each new study. It is important that the analyses can go one step further than this overall general relationship. One move forward is to try to understand the characteristics of poverty which affect health the most. This could help in better understanding the real mechanisms behind the relationship between poverty and health and intervening with better policies.

Our results show that poverty is more detrimental the longer the individual has been poor in the past. These findings are consistent with those available in the literature. For example, Benzeval and Judge (2001) analyzing the British Household Panel Study from 1991 to 1996/7 report that the higher the numbers of years spent in poverty the worse is health after controlling for age, sex and initial health. By extending the analysis to the European level, our study confirms the previous country-specific evidence. In this sense, the robustness of the results was not obvious and shows that this line of investigation might be particularly fruitful also for future analyses. Moreover, our findings are in line with what we could expect by looking at the structure of poverty in Europe. Most of the identification of our results comes from southern European countries, since these are the ones with the highest proportion of highly persistent poverty. The opposite is true for northern Europe, with the only relevant exception of the UK.

Besides the link between poverty, time and health, we find only little evidence that the distribution of the years in poverty significantly affects health. If, for example, a respondent has been poor four times in the last eight years, whether these four years are one after the other or follow an alternate path does not make a great difference. Also, we find no evidence of a relationship between poverty intensity and health.

We believe that the reason of this lack of evidence comes from the countries analyzed in the paper. We do not expect this result to hold for less developed countries. The European Union distinguishes itself from other countries with a clear endorsement of the relative concept of poverty. The measures of income poverty within the Laeken indicators are based on member specific poverty lines equal to 60% of the median of the (equivalent) income distribution of the specific country. These thresholds vary considerably within EU15 member states. In 1999, for example, the poverty line for a single person household is approximately equal to a minimum of 4,700€ (PPPs) for one year in Portugal up to a maximum of 12,600€ (PPPs) in Luxembourg (see Förster, Tarcali and Till, 2004). These amounts are high when compared to the absolute poverty lines proposed by the World Bank such as 1$ a day. If, in addition, we take into account the fact that health services are often publicly provided to EU citizens,

we may conclude that being in poverty in Europe is more related to not being able to afford to live like most of one's peers as opposed to not having the minimum amount of income required to satisfy basic needs. What matters in Europe is the episode of poverty and the shame associated to it, not the intensity of poverty. At the same time chronic poverty is harmful for health while the sequence of the episodes does not matter.

Three limits of our study are worth mentioning. First, unfortunately we could rely only on an eight-year analyzed with a longer horizon. Persistence is likely to have even stronger effects when referred to a longer period. Second, in order to see the effect of poverty persistence, we sub-select a balanced panel of respondents that stay in the survey for all the eight waves. This, we believe, is the minimum required period for the purpose of the analysis. To the extent that attrition is related to unobserved characteristics, however, this sample selection could potentially be a problem. Following the recent literature using the same dataset (see, for example, Garcia-Gomez, 2011, Hernandez-Quevedo et al., 2009), we implicitly disregard this sample selection issue. Third, even if we control for initial health status, we cannot rule out the issue of reverse causality. Since we looked at the long run impact of poverty, the reasons behind the initial shock is somehow less relevant for our conclusions than in standard cross-sectional studies. Nevertheless, the identification of a causal relation from poverty to health would require some understanding of the reasons why someone has fallen into poverty in the first place. Unfortunately, with the available dataset we were not able to perform such an analysis.

Given the results and the limits of the study, future research can move in different directions. For example, one could tackle the issue of reverse causality by using more detailed panel datasets already available on specific countries, such as Germany and the UK in Europe. On the other hand, it would be interesting to study the relationship between poverty persistence, health and welfare states. In this sense, since in the present study we were not able to perform a country-specific analysis, a comparative approach might add great value to the conclusions. One possibility could be, for example, to compare US data with European findings. Finally, we believe that linking the poverty measurement literature to health could help substantially in our understanding of the phenomena. Different indices should be employed in different contexts, depending on the requirements and the objectives of the analysis.

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Table 1: Descriptive statistics.

wave	*_stats*	*income*	*sah*	*poor*	*age*	*sex*	*unemp*	*university*	*hh_size*	*retired*	*housework*	*inactive*
1994	mean	10355.92	3.81	0.19	44.89	1.53	0.06	0.15	3.38	0.16	0.17	0.03
	sd	9084.41	0.95	0.39	16.63	0.5	0.25	0.36	1.52	0.36	0.38	0.18
1995	mean	10849.77	3.75	0.18	45.72	1.53	0.06	0.16	3.29	0.17	0.16	0.04
	sd	8154.88	0.94	0.38	16.48	0.5	0.25	0.36	1.49	0.37	0.37	0.19
1996	mean	10825.12	3.72	0.18	46.71	1.53	0.06	0.16	3.25	0.18	0.16	0.03
	sd	8091.66	0.94	0.38	16.48	0.5	0.24	0.36	1.48	0.38	0.37	0.18
1997	mean	11186.46	3.7	0.18	47.72	1.53	0.06	0.16	3.21	0.19	0.16	0.03
	sd	7798.37	0.94	0.38	16.48	0.5	0.24	0.36	1.47	0.39	0.36	0.18
1998	mean	11348.64	3.67	0.17	48.7	1.53	0.05	0.17	3.16	0.2	0.15	0.03
	sd	8024.38	0.95	0.38	16.49	0.5	0.22	0.38	1.45	0.4	0.36	0.17
1999	mean	11542.8	3.61	0.17	49.69	1.53	0.05	0.18	3.12	0.22	0.16	0.03
	sd	9464.19	0.96	0.38	16.49	0.5	0.21	0.39	1.43	0.41	0.36	0.17
2000	mean	11786.77	3.62	0.18	50.68	1.53	0.04	0.17	3.08	0.23	0.16	0.03
	sd	10469.99	0.95	0.38	16.5	0.5	0.2	0.38	1.42	0.42	0.36	0.17
2001	mean	12396.14	3.61	0.18	51.68	1.53	0.04	0.18	3.04	0.24	0.15	0.04
	sd	9138.54	0.96	0.38	16.5	0.5	0.2	0.38	1.41	0.43	0.35	0.18

***sah**: Self Assessed Health; **sex**: 1 for male, 2 for female. **unemp**: unemployed; **university**: university degree; **hh_size**: household size (number of members as in ECHP); **retired**: receiving a pension; **housework**: not-working partner; **inactive**: not working and not seeking for a job.*

Table 2: Poverty across eleven European countries

country	*Sample size*	*Poor*		*never poor*		*always poor*		*years in poverty*
		N	%	N	%	N	%	
denmark	2548	274	0.11	1812	0.71	29	0.01	2.82
netherlands	4559	295	0.06	3432	0.75	26	0.01	2.53
belgium	3132	404	0.13	2134	0.68	93	0.03	3.29
france	7003	1057	0.15	4395	0.63	225	0.03	3.36
ireland	2920	675	0.23	1724	0.59	62	0.02	3.37
italy	9098	1900	0.21	4873	0.54	317	0.03	3.43
greece	6313	1605	0.25	3058	0.48	365	0.06	3.73
spain	7639	1632	0.21	4052	0.53	254	0.03	3.32
portugal	7203	1886	0.26	3498	0.49	659	0.09	4.27
germany	7607	773	0.1	5268	0.69	144	0.02	2.91
uk	5963	927	0.16	3569	0.6	203	0.03	3.43

never poor*: never experienced poverty in 8 years;* ***always poor****: have been poor every year;* ***years in poverty****: average number of times in poverty conditional on not being a "never poor".*

Table 3: Poverty indexes across time

Year	*Years in Poverty*			*BCD(0)*			*BCD(1)*		
	Mean	*Min*	*Max*	*Mean*	*Min*	*Max*	*Mean*	*Min*	*Max*
1996	0.54	0	3	0.39	0	3	0.13	0	2.99
1997	0.71	0	4	0.48	0	4	0.15	0	3.99
1998	0.89	0	5	0.55	0	5	0.17	0	4.85
1999	1.06	0	6	0.62	0	6	0.19	0	5.81
2000	1.24	0	7	0.68	0	7	0.21	0	6.69
2001	1.42	0	8	0.75	0	8	0.23	0	7.62

Table 4: Probability of getting worse

Probit on **1**[$sah_8 < sah_0$]								
Models	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***
Years in poverty	0.036** (0.003)			0.034** (0.004)			0.049** (0.007)	0.038** (0.004)
BCD(0)		0.037** (0.004)			0.026** (0.005)		-0.017 (0.10)	
BCD(1)			0.081** (0.011)			0.054** (0.015)		0.008 (0.015)
Poor in 2001				0.021 (0.025)	0.084** (0.022)	0.106** (0.021)		
LL	-24701	-24732	-24723	-24701	-24716	-24720	-24699	-24701
***Sample**: Individuals in eighth year survey that were not chronically ill in 1994 (in 1995 for Germany) and for which sah in 1994 was higher than 2. **Model**: Probit **Controls:** sah in 1994, age, sex, income in 1994, education, family size, employment status, country dummies*								

Table 5: Probability of being in bad health

Panel Probit on **1**[sah_t<3]								
	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***
Years in poverty	0.073** (0.003)			0.058** (0.002)			0.058** (0.002)	0.072** (0.005)
BCD(0)		0.058** (0.011)			0.043** (0.004)		0.021 (0.012)	
BCD(1)			0.125** (0.011)			0.091** (0.012)		0.000 (0.156)
Poor in 2001				0.097** (0.015)	0.097** (0.014)	0.110** (0.015)		
LL	-107686	-104675	-104697	-107666	-104652	-104663	-107683	-107686

Sample*: Individuals were not chronically ill in 1994 (1995 for Germany).* ***Models****: Panel data Probit for the period 1997-2001* ***Controls:*** *sah in 1994, age, sex, income in 1994, education, family size, employment status, country dummies*

Table 6: Marginal effects

Years in Poverty	***sah***	***Dep: 1[sah_8<sah_0]***	***Dep: 1[sah_8<3]***
1	-0.035	0.020	0.019
2	-0.056	0.048	0.038
3	-0.048	0.038	0.030
4	-0.096	0.078	0.067
5	-0.102	0.079	0.090
6	-0.092	0.08	0.078
7	-0.165	0.131	0.134
8	-0.170	0.165	0.163

Sample: *Individuals in eighth year survey that were not chronically ill in 1994 (in 1995 for Germany).* ***Marginal effects:*** *change in dependent variable when "years in poverty" increases from 0 to row. For the column "SAH", calculation based on a linear regression using controls on observations in eighth year. For the last two columns, marginal effects are calculated using the model with the lowest AIC value.* ***Controls:*** *sah in 1994, age, sex, income in 1994, education, family size, employment status, country dummies*