MULTIPLE DEPRIVATION IN ITALY: LONGITUDINAL EVIDENCE AND COMPARISON TO EUROPEAN COUNTRIES·

FRANCESCO FIGARI

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by Francesco Figari[1]

Abstract

According to the agenda against poverty and social exclusion set by the European Union in 2001, reliable and accurate quantitative indicators are considered one of the most important tools to monitor the Lisbon Strategy. One of these is a multidimensional indicator of direct poverty known as multiple deprivation.

This paper is a longitudinal analysis of it in twelve European countries. The first seven waves of the European Community Household Panel (ECHP) are used to analyse the level of deprivation and to investigate the effects of socio-economic determinants through fixed and random effects models.

The main results show that European countries are very heterogeneous in terms of deprivation level and the role of the main socio-economics determinants. The level of observed deprivation is coherent with the traditional welfare classification of European countries with a higher level in Southern and Liberal countries than in Northern ones. The impact of the socio-economic determinants on deprivation score is much differentiated but it reveals important causal relationships related to employment status and the educational level of the reference person in the household.

1. Introduction

Despite the rising prosperity levels, the persistency of poverty in industrialised countries is still a significant problem and it involves the more vulnerable categories: children, lone parents, working poor, old people. From a policy point of view, issues are raised concerning the efficacy of the redistributive role of the tax-benefit systems. In a cross-countries view, it is strictly related to what extent the differences in welfare state structures can account for the differences in levels and determinants of poverty and deprivation (Fouarge and Layte 2003). The recent theoretical debate on the characteristics of poverty focuses on the multidimensional perspective rather than a unidimensional one and the shift from static to dynamic analyses (Atkinson 2003). As a consequence, the concept of poverty is often substituted by that of social exclusion with a greater emphasis on social relations. Consequently, the measurement methodology of social exclusion should take into account that "deprivation across a number of aspects of life is being experienced" (Nolan and Whelan 1996).

The main research interest of this paper is to what extent multiple deprivation, such as a multidimensional indicator of direct poverty, is a common feature in Europe in a longitudinal perspective in terms of level and determinants. The analysis examines, at the European level, the relationship between deprivation and a number of socio-economics determinants including income, labour market status, human capital endowments and other personal and household characteristics. It exploits the cross-country and panel nature of the ECHP survey.

The paper is structured as follows. The next section introduces the theoretical background in terms of differences between poverty and deprivation. Section 3 reviews the more recent empirical works in the European Union. The data are presented in section 4. The measurement techniques of deprivation and some descriptive statistics are analysed in section 5. The econometric model is presented in section 6 followed by the results in section 7. The paper ends with the main findings and some further developments.

2. Theoretical background

The relativity of the poverty is known from Adam Smith's (1776) definition as a condition in which "whatever the custom of country renders it indecent for creditable people, even of the lowest order, to be without". More recently with the works of Townsend (1979), definitions of poverty which are absolute have been found

inappropriate and misleading in favour of a definition of both poverty and deprivation "relative to need, to time and to the conditions of others" (Brown and Madge 1982).

Indeed, a more detailed specification suggests considering the distinction between the subsistence and the deprivation definition of poverty (Ringen 1988, Townsend 1993[2]). In other words the concept of poverty can be defined and measured either indirectly or directly. As an indirect concept, poverty (or subsistence) refers to insufficient resources to achieve a minimum level of consumption. On the other hand, the deprivation definition is direct in the sense that it refers to the exclusion from the ordinary way of life in terms of outcomes: consumption, leisure and social activities. The link between subsistence and deprivation can be very close even if the deprivation refers to a wider definition concerning the standard of living in terms of "…absence or inadequacy of those diets, amenities, standards, services and activities which are common or customary in society" (Townsend 1979). According to the distinctions made by Townsend between material and social deprivation, reflecting the lack of "resources, amenities, goods and services and physical environment" rather than "roles and relationships, social contacts, and membership of society", it is clear that deprivation is "a multiple concept that refers to the coincidence of two or more social adversities" (Brown and Madge 1982).

The method by which to measure the distinct definitions of indirect and direct poverty has been an issue that informed the literature in the 1990s in the search of the proper correspondence between the two different definitions of poverty and the right measurement of them. Nevertheless it is always important to refer to deprivation in an objective sense rather than in a subjective one: the measurement indicators should be related to "conditions, relationships and behaviour rather than attitudes or beliefs" (Townsend 1979, 1993). Nowadays the literature seems to agree with the different role played by monetary and non-monetary measurement tools.

On the one hand, low income can be considered a proxy of indirect poverty but it suffers at least from four big limitations:

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[2] "… *Deprivation is as important a concept as poverty... The concept has to be distinguished from poverty. People can be said to be deprived if they lack the material standards of diet, clothing, housing, household facilities, working, environmental and locational conditions and facilities which are ordinarily available in their society, and o not participate in or have access to the forms of employment, occupation, education, recreation and family and social activities and relationships which are commonly experienced or accepted. If they lack or denied resources to obtain these conditions of life and for this reason are unable to fulfil membership of society the can be said to be in poverty.*", Townsend 1993.

i) It is only an indirect measure of poverty since it deals with resources and not with living standards.

ii) It is often considered as financial inflows at one specific point in time without taking into account physical assets and savings.

iii) Income measurements do not consider other resources such as savings, giving and homemade products.

iv) It can suffer from measurement errors, especially at the bottom and the top of income distribution.

As summed up by Ringen (1988), "income is not a reliable measure of poverty once poverty is defined directly. It is an arbitrary measure, empirically as well as theoretically".

On the other hand, non-monetary indicators can compensate such limitations and be useful in order to measure the deprivation aspect of poverty because they:

i) Provide direct measure of exclusion due to the enforced lack of durables, leisure activity and other amenities.

ii) Measure a persistent situation rather than a temporary one based on the flow of income.

In other words, a deprivation measure can be considered as a direct measure of living standards derived by a set of non-monetary indicators.

In the literature three main uses of deprivation indicators can be distinguished:

i) Townsend (1979) analysed the relationship between a deprivation index and the household income in order to derive an income poverty threshold from the deprivation score.

ii) Mack and Lansley (1985) and Gordon et al. (2000) used the deprivation index to identify the poor households directly.

iii) Layte et al. (2000) developed a dual approach defining the concept of "consistent poverty" as the combination of a low income and deprivation condition in the life style deprivation dimension.

From a policy point of view, it has been suggested (Atkinson et al., 2002) one should consider a range of information rather than a single indicator, such as income, in order to identify those suffering from exclusion due to enforced lack of resources. At the European level, even if each member state is responsible for the social policies, the availability of reliable and accurate quantitative indicators is considered one of the most important tools to monitor the Lisbon Strategy against poverty and social

exclusion as confirmed by the conclusion of Laeken Summit in December 2001. Some countries, such as Austria and Ireland, have already included a set of non-monetary indicators in the poverty measures in their National Action Plans on Social Inclusion. The Irish government adopted a definition which stated that "people living in poverty if their income and resources (material, cultural and social) are so inadequate as to preclude them from having a standard of living which is regarded as acceptable by Irish society generally" (National Anti-Poverty Strategy 1997).

Clearly the consideration of different concepts of poverty can have important policy implications due to the different personal, demographic and economic characteristics of the individuals identified as the target of specific policies. To sum up "defining poverty solely in terms of income exposes us to the danger of failing to identify those groups most at risk of exclusion from customary life-standards" (Whelan et al. 2004b).

Moreover the importance attributed to poverty over a period of time rather than at a particular point in time, encourages taking into account the deprivation measures, as more stable indicators than income. "In relation to the policies of the European-type welfare state, deprivation is a more appropriate definition of poverty than subsistence" (Ringen 1988).

3. Literature review

At the European level, many studies (Nolan and Whelan 1996, Layte et al. 2000, 2001, Whelan et al. 2001, 2002, 2002b, 2003, 2003b, 2004, 2004b) have focused on the different dimensions of deprivation and on the relationship between income poverty and deprivation highlighting the mismatch between them (already investigated for the industrialised countries by Townsend 1979, Mack and Lansley 1985, Nolan and Whelan 1996). They take advantage of the panel structure of the ECHP data in order to explore the relationship between poverty and deprivation, the persistency of the poverty (over a three-year period) and the evolution over time of consistent poverty.

The impact of income on the basic and secondary dimensions of deprivation is stronger compared to the housing and environmental dimensions, with bigger effects in Spain, Portugal and Greece. In general terms, despite the differences across countries, the relationship between income and deprivation seems to be weaker than it is generally assumed. Considering the economic strain of the household, in terms of

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difficulty in "making ends meet", the deprivation has a stronger impact than the income (Whelan et al. 2001). Moreover the mismatch is bigger if the income poverty line is fixed at a lower level. At a poverty line at 40% of median income, income poverty and deprivation seems to measure two different phenomena. (Layte et al. 2000).

They established a deprivation threshold as closely as possible to the persistent poverty threshold and showed that a large proportion (i.e. 45-60%) of those persistently poor do not suffer from basic or secondary deprivation.[3] (Layte et al. 2001). On the other hand, some of those not suffering from persistent poverty can suffer from deprivation. The people persistently poor have a basic deprivation systematically higher than others while the relationship between them and the other dimensions of deprivation is weaker (Whelan et al. 2002).[4] They also analysed the position of the persistently poor, economic well-being (in terms of ability to make ends meet) and social isolation.

Whelan et al. (2003) highlighted that in a cross-countries view even if persistent poverty and current life-style deprivation are related in a uniform way (with the exception of the Denmark case) following the different welfare regimes, they refer to two different dimensions as the overlap is far from perfect. They tried to explore the determinants of both the aspects and showed that the involvement in the labour market (in terms of self-employment versus non manual employee and long term unemployment) has a bigger impact on persistent poverty while the impact of separation or divorce and of lone parenthood is bigger on the deprivation. In other words it seems that the former is more related to the "generation of the resources", while the latter to the "additional demands".[5] It is confirmed also considering the determinants of consistent poverty and consistent deprivation (Whelan et al. 2003b).

An important issue concerns whether the persistence of the mismatch between income poverty and deprivation is found with a longitudinal perspective or if it is only present at a cross-section level. Whelan et al (2004) improved their previous analysis considering the first five waves of the ECHP and taking into account both the

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[3] "… the risk of multiple life-style deprivation is substantially higher for the persistently poor but still is only a minority experience even for that group".
[4] "… in all countries those effacing persistent income poverty constitute a minority of the multiply deprived".
[5] "… while persistent income poverty measure is particularly sensitive to the manner in which resources are generated, the deprivation measure appears to be more sensitive to differential needs associated with family factors".

persistence and recurrence of poverty and deprivation. Even if the income persistent poverty seems to have a closer relationship to the deprivation measure (Whelan et al. 2002b), they found the level of overlap between income persistent poverty and persistent deprivation very similar to that of cross-section analysis.

Layte et al (2001) exploited the cross-country differences in the determination of deprivation, highlighting how different welfare regimes can influence the effect of income variation on the deprivation level: very low for the countries characterised by social-democratic or corporatist regimes, higher for the liberal countries and strong in the southern countries.

Muffels and Fouarge (2003) found a strict relationship between the different welfare regimes and the level and the explanation of deprivation and such a regime "certainly contributes to explaining the performance of countries in preventing social exclusion".

Other studies, directly focused on the British case, are interesting especially for the adopted methodology. Gordon et al (2000) summarised the main results obtained using the Poverty and Social Exclusion Survey of Britain (PSE) that replicates the Breadline Britain survey. They focused on adult poverty, child poverty and their changes over time, measuring poverty in terms of both deprivation and income. Calandrino (2003) reviewed the Irish approach based on the concept of consistent poverty using the Families and Children Study (FACS). He identified four deprivation dimensions by factor analysis and he confirmed the mismatch between income poverty and deprivation. A hardship index, based on a set of social indicators, has been developed by the Policy Studies Institute (Vegeris and McKay 2002, Vegeris and Perry 2003) from 1991 and recently refined using the Families and Children Study (FACS). It includes nine dimensions regarding housing hardship, financial problems and expenditure deprivation (food, clothes, durables and leisure activities) accounted for by a relative material deprivation score based on a prevalence weighting of the items in each group. A household is considered deprived in each deprivation category if it belongs to the highest 7.5 per cent (an arbitrary threshold) in the distribution of deprivation score in each category. The final hardship index marks from zero to nine in order to classify each household according to its hardship (none, moderate or severe). The more recent work is Berthoud, Bryan and Bardasi (2004). For the first time they examined the longitudinal relationship between income (and other determinants) and deprivation over time, using both the Families and Children

Study (FACS) and the British Household Panel Survey (BHPS). They found that the underlying relationship between income and deprivation is stronger than the longitudinal one and it involves many policy implications. First of all that "to dip into poverty just for a short a period need not be a primary area of concern" as well as a temporary escape from poverty. From a measurement point of view they highlighted the importance of a recalibration of the deprivation index every year and the unreliability of the low income data.

4. Data

The empirical analysis of this paper is based on the first seven waves, from 1994 to 2000, of the ECHP (European Community Household Panel), a harmonised longitudinal survey of a representative sample of households of fifteen (pre-2004) European Union member States. It covers data about demographic information, employment and job history, income, training and education, health, social relations, migration, and satisfaction of each individual older than 16 year old and supplementary information regarding composition, financial situation and accommodation of the household.

Some countries have been excluded for different reasons. Germany, Luxemburg and the United Kingdom, due to the lack or a different formulation of some questions related to the non monetary indicators, while Sweden was excluded because the survey is not a panel.

ECHP covers the 24 non-monetary indicators considered by Eurostat (2002) in its report on Income Poverty and Social Exclusion. They are used to define the different dimensions of deprivation and to construct the deprivation score in each country. They are analysed in detail in the next section. Most of the indicators are available just at the household level and then attributed to each individual. The assumption that the resources and then poverty and deprivation level are shared equally among all household members is reasonable (Donnison 1988). As a consequence, the unit of analysis of the longitudinal analyses is the individual which we follow across the waves giving to each of them the attributes (i.e. deprivation score and socio-economic characteristics of the reference person) of the household who they belong to in each wave.

In order to model the level of deprivation we take into account its determinants in terms of the income and wealth of the household, labour market status, human capital

endowments and other personal and household characteristics influencing individual preferences.

The income variable refers to the net household income (including transfers and after the deduction of the income tax and social security contributions) received in the calendar year prior the survey, with the main source indicated: employment, pension or social transfers.[6] In our analyses we do not consider any measure of equivalised income because we control for the main characteristics usually included in the equivalence scales (i.e. size and composition of the household). In order to allow longitudinal and cross-countries analysis to be made, the net income has been deflated to 2000 prices in each country, using the Harmonised Consumer Price Index (HCPI) provided by Eurostat, and expressed in purchasing power parities (PPPs). The values below the first and above the last percentile have been dropped in each country every year.

Home ownership is considered an important indicator both as income status proxy and also because most of the non monetary indicators of deprivation deal with the housing facilities and the neighbourhood.

The other determinant variables are personal characteristics of the reference person in the household, defined as the person responsible for it considering the real structure of each household: labour market status (i.e. employed, unemployed or inactive), educational level (i.e. less or more than secondary high school) and health status (i.e. good or bad). We also control for other variables that refer to the reference person - such sex and age – or to the household – such number of adults, number of children, marital status (i.e. married, divorced, widowed or never married) and family type (i.e. couple with kids, couple without kids, lone parent or single). A dummy variable for each year is also included in the analysis to take into account the variability just due to a different point in time.

5. Measurement of Deprivation

The measurement approaches of deprivation are complex as well as the concept of deprivation.

Even if we pass over the discussion about the reliability of the traditional measurement techniques against a more demanding approach (in the fashion of Item

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[6] It is not possible to use the last wave because the income variable refers to the year previous the survey and we do not have any information about the disposable income in the 2001.

Response Theory as proposed by Cappellari and Jenkins 2004 or Latent Class Analysis as done by Ayala and Navarro 2005), there is no agreement on the proper way to choose the non monetary indicators, combine them into an overall index, define a weighting procedure and identify a deprivation threshold.

As a consequence, it is necessary to deal with these aspects separately. A good review of the measurement issues with many references to international works is Nolan and Whelan (1996).

Firstly, the choice of the indicators does not reach a consensus in the literature. It is often influenced and constrained by the availability of the variables in the dataset rather than by a clear definition of the underlying concept. It is hard to consider the selection of indicators "perfectly representing the issues involved in the concept of deprivation" (Coombes et al. 1995) and this can be one of the reason why the deprivation label very often refers to a different aspect of exclusion. Moreover the selection of the indicators should take into account the specificity of each country in each point in time in order to really represent the deprivation relative to the context it refers to. Nevertheless, even if the choice is data driven, the relationship between the items should be assessed before summing them into a single index, in order to test the reliability of it. In order to examine systematically different dimensions of deprivation due to clusters of interrelated items some authors (Callan et al. 1993, Nolan and Whelan 1996) applied a factor analysis. Nolan and Whelan (1996), looking at the correlation between the observable indicators related to twenty-four items chosen from the ECHP, defined three underlying dimensions of deprivation, comprising the items more highly correlated with each other than with the other items:

1) Basic life-style deprivation, concerning mainly food and clothes.
2) Secondary life-style deprivation, concerning leisure activities, durables and financial situation.
3) Housing deprivation, concerning housing facilities and other durables.

Whelan et al. (2001) improved this analysis considering a five-factor solution, differentiating the housing dimension and defining the following dimensions, uniform to twelve countries in the European Union:

1) Basic life-style deprivation, concerning food, furniture, clothes, leisure activities, housing and financial situation.
2) Secondary life-style deprivation, concerning the possession of durables goods.
3) Housing facilities, concerning housing services

4) Housing deterioration, concerning structural elements of the house

5) Environment, concerning amenities of the house and environmental conditions of the neighbourhood.

Moreover they defined a Current life-style deprivation (CLSD) as the union of the basic and secondary life-style deprivation dimensions and the Overall deprivation dimension. Such dimensions were consistent across the twelve countries considered. Indeed a single model for each country did not give an appreciable improvement in the goodness-of-fit with respect to the overall one.

In this paper, we follow this five-factor solution considering twenty-four non-monetary indicators (see Annex I for details) in order to evaluate the five dimensions of deprivation plus the overall one. In order to test how the items of each dimension deal with the underlying deprivation concept, it is common (Nolan et Whelan. 1996, Berthoud et al. 2004) to calculate the Cronbach's coefficient alpha[7] to estimate the reliability of each indicator. Table 1 shows the values of the Cronbach's alpha and other correlation coefficients. A common threshold to judge if a dimension has been identified correctly is 0.60 and we can see that the values are from 0.65 (Denmark and The Netherlands) to 0.82 (Portugal). Countries with lower deprivation score have a lower Cronbach's alpha. The correlation of each item with the others in the same dimension is uniform across countries with values slightly higher in the housing facilities dimension. The correlation between the lack of each item and the equivalent income is always negative, with values higher in the basic and secondary dimensions.

< INSERT TABLE 1 HERE >

Looking at the average number of the items lacking in each country over the time, it is easy to note the differences in absolute values across countries and also the decreasing trend within each country. The difference in absolute values is great in the Basic Dimension, with larger number in Portugal and Greece (see Graph 1).

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[7] A correlation index that shows the extent to which a set of questions are all associated with each other.

Graph 1: average number of items lacking in the Basic Dimension
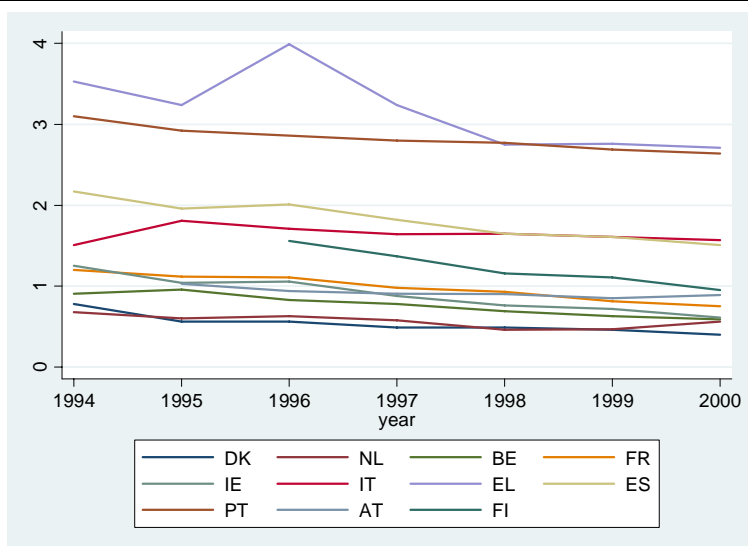
The differences across countries are less strong observing the average number of durables lacking and the convergence of the Mediterranean countries to the level of other countries is clearer (see Graph 2).

Graph 2: average number of items lacking in the Secondary Dimension
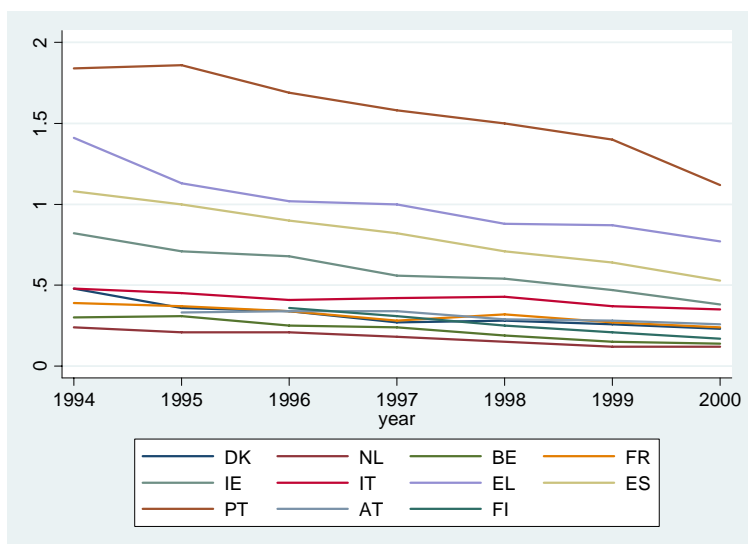
Nevertheless, the differences across countries and over time should be taken into account in the construction of the deprivation index in order to consider that deprivation, as well as income poverty, is a relative concept both with respect to the country and the time.

Starting from the set of *j* dichotomous indicators *I*, corresponding to the survey questions,

$$I_j = \begin{cases} 0 = possession \\ 1 = unaffordability\ of\ possession \end{cases} \qquad \text{with j = 1, ..., J}$$

where the value one indicates the enforced lack, and not an unwanted item, of durables goods, social activities or other amenities, different techniques have been widely applied in the more recent empirical works to derive a deprivation score.

Townsend (1979), Mack and Lansley (1985), Gordon et al. (2000) and Whelan et al. (2001)[8] calculated the deprivation score by raw sum of the indicators. Each item is given an equal weight in such an additive scale without any judgement value about the relative importance of it. Nevertheless the consideration of the proportion of people owning an item in a specific country and point in time is important to treat the deprivation as a relative concept. Coombes et al. (1995) and Berthoud et al. (2004) used a Z-score technique that involves a standardisation of the individual indicators considering the mean and the standard deviation of each indicator in the year considered. The index is given by the sum of each standardised indicator divided by the number of items considered. The prevalence weighting procedure is widely used (Desai and Shah 1988[9], Vegeris and McKay 2002 and Vegeris and Perry 2003) to give a different weight to some items or activities than others without using any subjective value judgements or consideration about the subjective necessity of a particular item based on a consensual approach (Muffels 1993, Hallerod 1995).

In this paper we use the prevalence weighting procedure, within each country and each wave, at the household level and then we attribute the deprivation score to the individuals. This procedure seems to be more intuitive and it has "the advantage of conceptual clarity" (Berthoud et al. 2004).

This approach considers the sample proportion of having an item

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[8] The a priori selection criteria of the indicators were different because Townsend selected the items possessed by a majority, Mack and Lansley those socially perceived as a necessity by the majority and Whelan et al. applied factor analysis to distinguish different dimension of deprivation.
[9] Desai and Shah considered both the disparity in the possession of an item between an individual and the community and the proportion of non-deprived for such an item.

$$p_j = 1 - \frac{\sum_{i=1}^{N} I_{ij}}{N}$$

and it uses it to derive each indicator

$$I_{ij}^{W} = I_{ij} p_j$$

A higher score, correspondent to the percentage of individuals owning the item, is given to the most commonly owned item and the sum of all indicators gives the final index

$$D_i^{W} = \sum_{j=1}^{J} I_{ij}^{W}$$

Then it is normalised by dividing it by the sum of the weights over all items j

$$D_i^{W} = \frac{\sum_{j=1}^{J} I_{ij}^{W}}{\sum_{j=1}^{J} p_j}$$

For simplicity of reading we multiplied it by 100, obtaining a score

$$D_i^{W} \in [0, 100]$$

In order to allow the comparability of the index over different years, Vegeris and McKay (2002) always used the weight of the year considered as the reference. This avoids the extra variance due to the changes across the years, but it does not allow the trend in the possession of the durables to be considered properly. On the other hand, considering country-specific and time-varying weights, this index compensates for variations in deprivation due to the trend of possession over time and cultural differences across countries.

Graph 3 shows the average overall deprivation score across countries in the year 2000. Even considering the weighting within each country the differences are evident. Denmark shows the lowest average scores (equal to 4.92) and Portugal the highest (19.22). Over time the average overall deprivation score has decreased in all countries; Ireland has improved its position while Austria, France, Italy and Portugal have a worse position in the ranking with respect to the other countries.

Graph 3: average overall deprivation index – year 2000
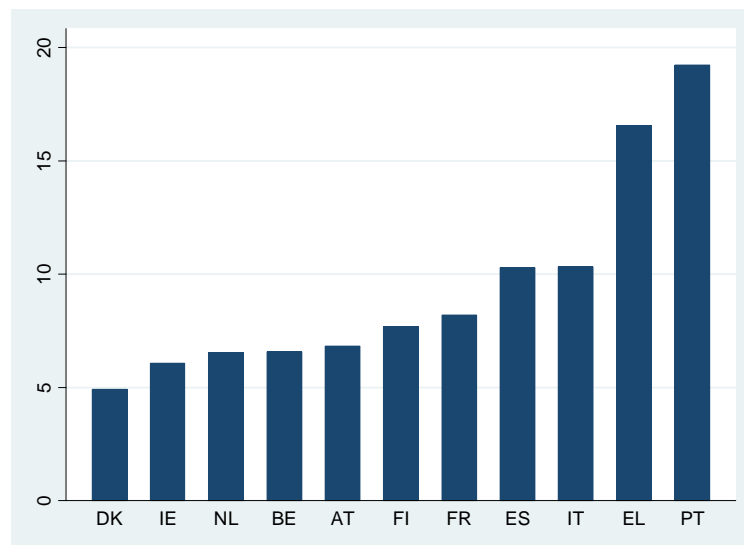
Table 2 shows the main statistics of the overall deprivation scores across countries. Considering the proportion of household with a deprivation score equal to zero (i.e. no item lacking), the lowest value is in Greece (1.81) and the highest in Ireland (46.48). On the other hand, the maximum deprivation score (i.e. the deprivation score of the worse off household observed in each country) ranges from 53.05 in the Netherlands to 85.8 in Portugal. From these figures it emerges clearly that the Southern countries face the worse situation in terms of deprivation.

< INSERT TABLE 2 HERE >

The definition of a deprivation index does not involve the solution of one important issue to be addressed: the threshold to consider an individual as "deprived". Despite of many problems accounted in the literature in the measurement of deprivation, the definition of a threshold remains an unsolved problem. Nolan and Whelan (1996) defined as deprived an individual with an enforced lack of at least one item in the basic deprivation dimension. However this measure does not take into account the relative importance of each item and the others deprivation dimensions. Gordon and Townsend (1990) used discriminant function analysis to define the income level that better identifies poor and non-poor people taking into account the deprivation indicators. In a similar way, Gordon et al. (2000) used ANOVA and logistic regression to identify the deprivation score that better discriminates between

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deprived and non-deprived people: both methods tend to maximise the between-group differences and minimise the within-group differences. Recognising the policy importance attributed to the income poverty line, this can be a guide for the deprivation threshold as well. We follow this approach, as already used by Whelan et al. (2001, 2003). Once the income poverty line is defined as 60% of median equivalent income we can derive the corresponding deprivation line set in a way to have the same percentage of household "poor" (i.e. if their income is below the poverty line) and "deprived" (i.e. if their deprivation score is above the deprivation line). This allows us to highlight the mismatch between income poverty and deprivation, which forms one of the reasons to investigate to which extent the deprivation is spread in the European countries and which are its determinants. Graph 4 shows the mismatch in each country in the year 2000. We can see that the percentage of household deprived between those are poor comes from 23 % in Austria to 43% in Portugal. In other words it means that 77% of poor in Austria are not deprived, 57% in Portugal and so on.

Graph 4: % of deprived household between poor household – year 2000
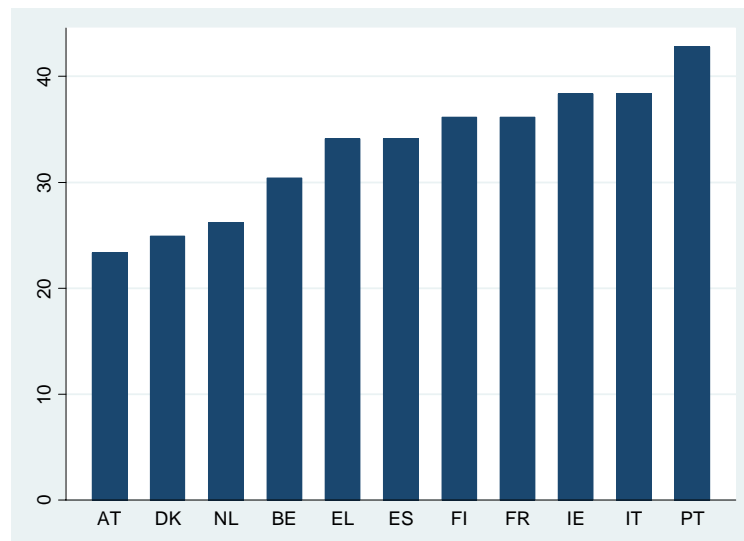
Due to this mismatch it is particularly important to investigate the relationship between income and deprivation. The correlation between the deprivation sub indexes and equivalent income is always negative but the dimensionality of deprivation is particularly important due to the impact of income on each deprivation dimension. The correlation between the overall deprivation index and equivalent income is

negative with values range from 0.17 (for Denmark) to 0.42 (Greece). Countries with higher deprivation scores show a higher correlation deprivation-income. A high income guarantees a lower deprivation score in these countries than in others. The correlation between income and the basic dimension of deprivation is always higher while it is close to zero for the environmental dimension.

< INSERT TABLE 3 HERE >

Nevertheless if we look at the relationship between income and deprivation at the bottom of income distribution we can observe that in all countries but Denmark, the Netherlands and Italy, the average deprivation score for the household with an equivalent income at the bottom of distribution is lower than the richer household. It is a common result as found in the more recent works on deprivation in the United Kingdom. Graph 5 shows the average of the overall deprivation score and of equivalent income considering groups of households at the bottom of income distribution with an equivalent income between two percentiles each time.

Graph 5: relationship between income and overall deprivation

Graphs by country

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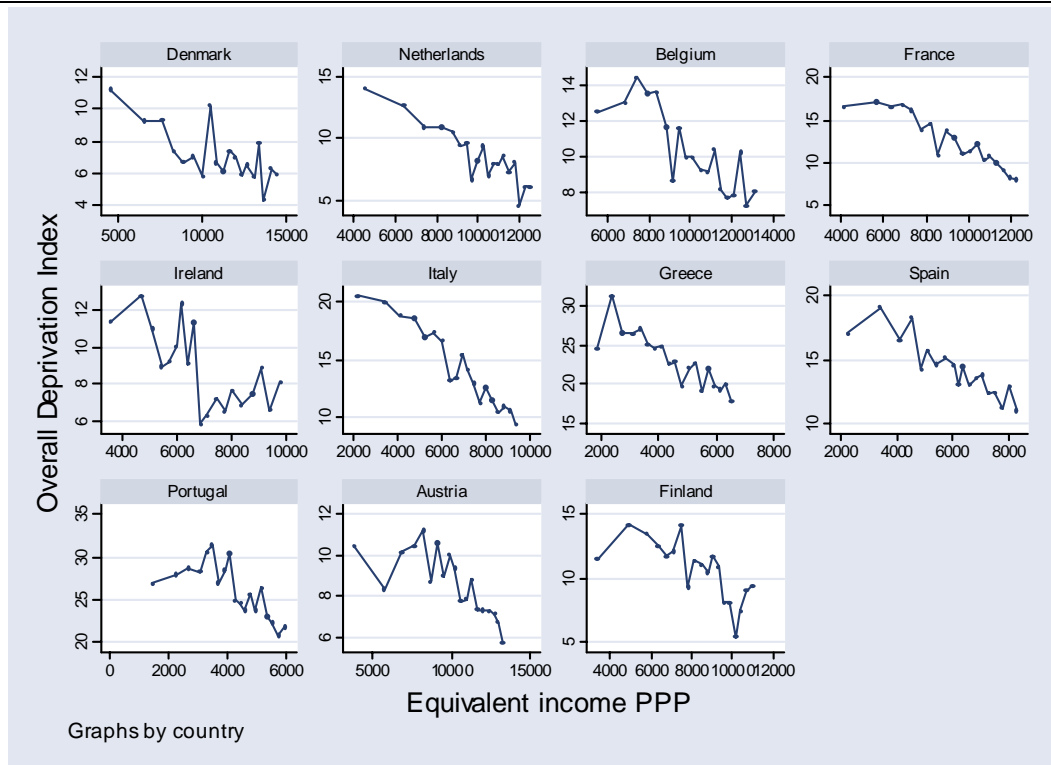
Three main reasons can be adopted: lower expectations of the poorest in terms of durables, facilities and social activities, short term fluctuations of income not immediately reflected in deprivation indicators and measurement income errors. This confirms the need of alternative and complementary ways to measure the poverty rather than the income alone.

6. Econometric model

In order to measure the effect of the socio-economic determinants on the deprivation score, we developed the following empirical model for deprivation,

$$D_i^W = f(I, J, E; P, H)$$

including the variables related to the income of household (I: income, sources of it and tenure status), labour market status (J), human capital endowments (E) and some personal (P) and household (H) control variables as well as other factors assumed to be unobservable. The dependent variable (D_i^W) is the score of overall deprivation (or specific dimensions where specified) obtained by the prevalence weighting procedure as explained in the previous section.

Due to the availability of a panel dataset we can specify the following one-way error component model

$$D_{it}^W = \alpha + \mathbf{x}_{it}\boldsymbol{\beta} + v_i + \varepsilon_{it} \tag{1}$$

where $\boldsymbol{x}$ is the vector of covariates, v_i is the individual-specific residual: it differs between individuals but for any particular individual its value is constant allowing us to capture the unobserved heterogeneity of the individuals that is constant over time (i.e. social condition, opportunity, ability). ε_{it} is the residual with the standard properties: zero mean, no serial correlation and heteroskedasticity, zero correlation with $\boldsymbol{x}$ and with v). The index $i = 1,...,I$ represents the individuals while the index $t = 1,...,T$ refers to the waves of the dataset. Averaging over time the equation (1) we obtain

$$\overline{D_i^W} = \alpha + \overline{\mathbf{x}}_i \boldsymbol{\beta} + (v_i + \overline{\varepsilon}_i) \tag{2}$$

whose OLS estimation gives us the between estimator $\hat{\boldsymbol{\beta}}_{BE}$.

Subtracting equation (1) from (2) we have

$$(D_{it}^W - \overline{D_i^W}) = (\mathbf{x}_{it} - \overline{\mathbf{x}}_i)\boldsymbol{\beta} + (\varepsilon_{it} - \overline{\varepsilon}_i) \tag{3}$$

whose estimate provides us with fixed-effects or within estimator $\hat{\boldsymbol{\beta}}_{FE}$.

The random-effects estimator, $\hat{\boldsymbol{\beta}}_{RE}$, is a weighted average of the between and within estimators from the estimation of

$$(D_{it}^W - \vartheta \overline{D_i^W}) = (1-\vartheta)\alpha + (\mathbf{x}_{it} - \vartheta \overline{\mathbf{x}}_i)\boldsymbol{\beta} + \{(1-\vartheta)v_i + (\varepsilon_{it} - \vartheta \overline{\varepsilon}_i)\} \tag{4}$$

where ϑ is a function of the variance of v and ε. If the variance of v is always zero, $\vartheta = 0$, the random effects estimator is equivalent to the pooled OLS estimator of (1). If the variance of ε is always zero, $\vartheta = 1$, the random effects estimator is equivalent to the fixed effect estimator.

The random effect approach assumes the unobserved individual effects uncorrelated with regressors,

$$E(v_i \mid \mathbf{x}_{it}) = 0$$

while the fixed effect specification relaxes this condition.

The assumption regarding the nature of the individual effect is a debatable issue: the fixed effect approach is costly in terms of freedom lost but the random effect model can suffer from inconsistency due to omitted variables.

The Hausman test can be used to test whether the unobserved heterogeneity is correlated with regressors. The Hausman test is given by

$$H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'[\mathbf{var}(\hat{\beta}_{FE}) - \mathbf{var}(\hat{\beta}_{RE})]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE})$$

and under the null hypothesis

$$H_0 : E(v_i | \mathbf{x}_{it}) = 0$$

the test statistic is distributed as χ_k^2 with k equal to the number of elements in $\boldsymbol{\beta}$.

In case of non-rejection of the null hypothesis, the individual effects are uncorrelated with regressors and both the random effects and the fixed effects estimators are consistent, but the first are efficient. If the individual effects are correlated with regressors, the fixed effect estimator is consistent while the random effect is not. Nevertheless the fixed effects estimation does not allow us to determine the impact of the personal and household characteristics which do not vary over time.

In this work, we omit a time specific effect (i.e. constant across individuals and different over time, such as macroeconomic parameters) because the deprivation score has been constructed as an indicator relative to each country and each year. Moreover the deprivation is a status related to personal characteristics and it is not influenced in the same way for all individuals by external factors and general economic situation. However, the presence of a specific individual effect (i.e. personal characteristics, social background, initial conditions…) seems to play an important role in the determination of deprivation level.

7. Results

We ran both fixed (FE) and random (RE) effects regressions for each country separately. We present the results in Table 4.

< INSERT TABLE 4 HERE >

The Hausman specification tests, comparing the fixed effects specification with the random effects specification, suggest a preference for the former in all cases. The statistics, reported at the bottom of the Table 4, indicate rejection of the null hypothesis of individual effects uncorrelated with regressors. As expected, the random effects coefficients are in general more significant than the fixed effect ones and we can compare them only if the variables are time-varying.

The relationship between deprivation and income is always clearly negative and significant. Where the cubic specification of the income function is significant (7 out of 11 countries), the pattern is equivalent in all countries revealing a decreasing function in income at a decreasing rate with a negative sign of the cubic coefficient. Considering the income sources, if the household income comes mainly from social transfers the deprivation level is higher: the coefficients are always positive even if not always significant in the fixed effects model. The effect of depending largely on pensions is not always clear: the coefficients are positive in Denmark, the Netherlands and Finland and not significant in Ireland and Greece. In the other countries the coefficients are negative. These effects would be clearer by analysing the decomposition of the household income in the different components.

The most important associations are related to the main activity status and the education level of the reference person in the household. If the reference person is unemployed the deprivation score is higher in all countries and also in Italy where the coefficient of the fixed effects model is not significant. In some countries (Denmark, Ireland, Greece, Portugal and Austria) the coefficients of the fixed effects model reveal that moving into and out of the labour market is as important (or more) as being in or out of it. The inactivity status of the reference person (mainly due to retirement or house working) has a positive effect on the deprivation score. The coefficients are not always significant but in other countries (the Netherlands, France, Ireland, Spain and Finland) they reveal the importance of a change in the status. A higher secondary education (secondary school or degree) has a negative effect on the deprivation score. Even if it is not possible to distinguish between the effects of different school levels, a qualification has an important effect on the deprivation of the household. Where the fixed effects coefficients are significant, they reveal that a higher new educational level does not imply a big differentiation in the deprivation score, except in Austria. The coefficients related to home ownership and health status are always significant. As expected, the deprivation score is smaller if the household lives in its own house and if the reference person has a good health status.

The effect of family composition is not completely clear: the larger the total size of the family, the higher the deprivation score the household faces but the effect of the number of children less than 16 years old is not clear. The coefficients are negative in Denmark, France, the Netherlands, and Greece. The marital status of the reference person reveals than when the coefficients are significant the deprivation score is

higher if the reference person is divorced or has never been married, while it is lower if the reference person is widowed. The former relationship is associated to the sex of the reference person in the household and to the composition of the family while the latter relationship is strictly related to the negative effect of the age on the deprivation score. Other aspects being equal, if the reference person in the household is female, the deprivation score is always higher, with an important effect of the gender-headed household change in Denmark, France, Italy, Spain, Portugal, Austria and Finland. The dummy variables for the composition status of the family, different from a couple with kids, when significant, show a positive effect on the deprivation score. The negative effect of age on the deprivation score can be attributed to a number of specific behaviours of old people: they can have adopted a thrifty life style, accumulated durable goods and built up assets during their life in order to prevent lack of resources in the oldness.

In order to investigate the delayed effect of some socio-economic determinants on the deprivation score we ran a new model adding the value of the income lagged (i.e. the value of income in the year previous to each wave considered) and a variable related to the employment status of the reference person in the past. We present the results of FE and RE estimations of this new model in Table 5.

< INSERT TABLE 5 HERE >

The main relationships do not vary in their sign and value.

The impact of a change in the lagged income (always significant in the FE regressions) on the deprivation score is smaller than that of a change in the current income only in 5 out of 11 countries (the Netherlands, Belgium, France, Spain and Austria): in the others, the delayed effect is larger than the current one or at least equal (Denmark and Italy). This confirms that in these countries there is not strict synchronization between changes in incomes and deprivation score. The effect of being unemployed in the past is always significant in the RE regressions but smaller (except than in Greece) than the effect of a current absence of job.

In order to compare the differences across countries in more detail we simulated the deprivation level and the impact of income in the different countries considering a married couple with 2 children and 1 full time worker with an income equal to the 10th and 5th percentile of the income distribution of this group within each country.

(Reference individual ages 50 years old and has higher secondary educational level and his own house; the youngest children ages 15 years old and the oldest more than 16 years old). Graph 6 shows the overall deprivation scores in the different countries, with a clear higher score in the Southern countries (Italy, Spain, Greece and Portugal).

Graph 6: overall deprivation scores
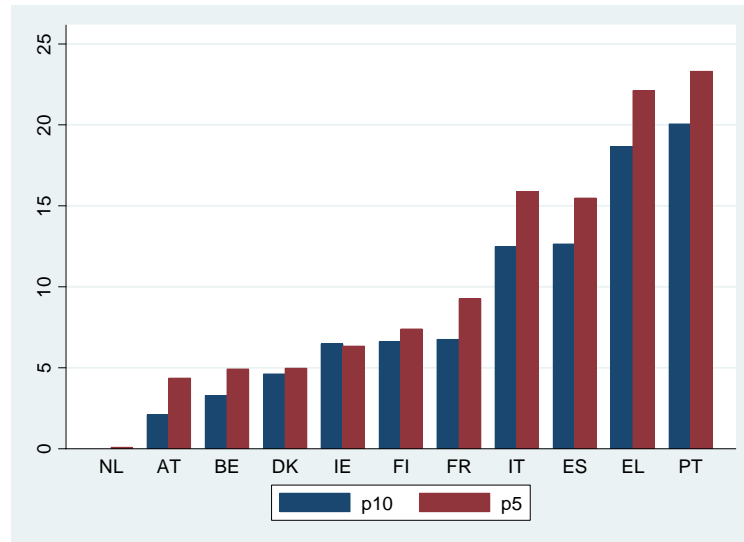
The variation of the deprivation score due to a decreasing in income (from income equal to the 10th percentile to income equal to the 5th percentile) is much differentiated across countries as well. The elasticity of the deprivation score to the income allows us to catch the real impact of income on deprivation according to the position of a household in the income distribution of its own country.

Graph 7 provides evidence of a strong differentiation of the elasticity, both across countries and across individuals with a different income within the same country, with the elasticity of poorer household smaller than that of richer household.

Graph 7: elasticity of deprivation score to income
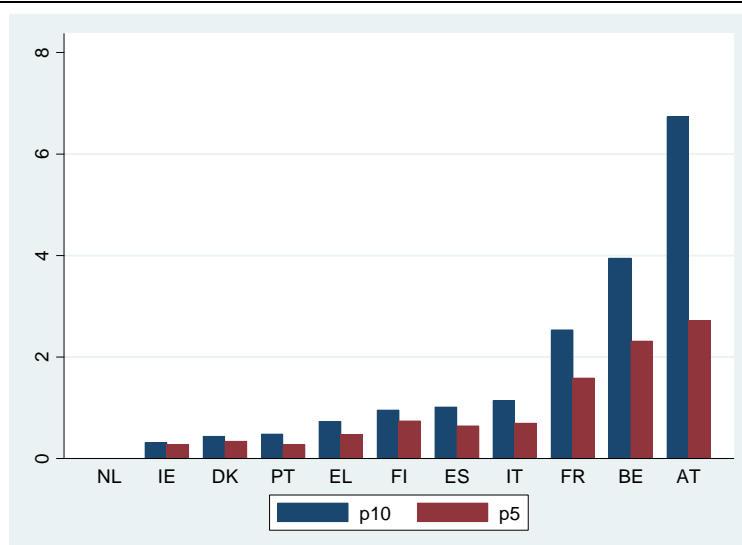
As noted above, Italy shows an average deprivation score (10.32 in 2000) above the European Union mean and lower only than that of Greece and Portugal: this fact deals directly with the effects of the public policies implemented in the past. On the one hand, the mismatch between financial poverty and deprivation (38.37% in 2000) is considerable and it should be taken into account in the identification of the individuals more likely at risk of social exclusion. On the other hand, in contrast to most of the other European countries, the poorest do not show a lower average deprivation score and it confirms the validity of financial poverty measurements also with respect to the lowest part of the income distribution. Looking at the estimated coefficient, the delayed effect of income is as important as the current one, confirming that the deprivation indicator is more stable than the monetary ones. To be dependent on a pension and being older has a negative effect on the deprivation score, showing the favourable position of the elderly. Nevertheless the deprivation score is higher with a change in the gender of the reference person of the household with important implication for the family policies.

At the European level, the results of these empirical analyses show that only the average deprivation score is coherent with the traditional classification of the countries for welfare regimes with higher level in Southern countries rather than in Liberal and Northern ones. The impact of income and other socio-economics determinants on the deprivation score does not follow such a regular pattern. It makes it difficult and challenging to investigate to what extent a specific policy can have a

precise effect on the household deprivation within each country and in a comparative view as well.

8. Conclusion and further developments

The results of the longitudinal analyses conducted using the ECHP survey show that European countries are very heterogeneous in terms of deprivation level and role of the main socio-economics determinants of it. On the one hand, the level of observed deprivation is coherent with the traditional welfare classification of European countries with Southern countries showing a higher average deprivation score persistent over time. On the other hand, the impact of the socio-economic determinants on deprivation score is much differentiated and it makes it difficult to find some common features in the causal relationship between them and deprivation across countries. Nevertheless the human capital endowments, the employment status and the quality of income are important factors in explaining the deprivation levels of the households. From a policy point of view, it implies that, in order to fight social exclusion, income policies should be accompanied by more comprehensive policies including employment, education, family, housing and health programmes.

In order to evaluate the capacity of the different welfare regimes to cope with deprivation in preventing and facing it, we have to consider improving the regression analyses in order to investigate the dynamic of deprivation in terms of the short and long term effect of the socio-economic determinants on it. The structure of the dataset allows such a dynamic analysis to be conducted to understand how an individual faces deprivation over time as his income, and other characteristics, rise and fall. This analysis can be based on a dynamic panel model through the implementation of the GMM estimators developed by Arellano and Bond (1991, 1995) and Blundell and Bond (1998). Moreover such a model would allow us to also consider the persistence of deprivation over time and to take into account the impact of the determinants considering the initial condition in terms of deprivation score.

Two other further developments are strictly related to this work.

The first development deals with the definition of a deprivation threshold, to define the "deprived" people independently from the income poverty line. It would allow us to investigate the dynamics of deprivation in terms of transitions into and from deprivation and its relationship with the movement into and out the poverty status.

The second development deals with the measurement of multiple deprivation applying the methodology of the Item Response Theory used in psychometrics and educational tests (Cappellari and Jenkins 2004).

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Table 1: Cronbach's alpha and correlation coefficients. Different dimensions of the deprivation score

item	DK		NL		BE		FR		IE		IT		EL		ES		PT		AT		FI	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
Overall dimension																						
	α=0.65		α=0.65		α=0.7		α=0.71		α=0.76		α=0.74		α=0.79		α=0.73		α=0.82		α=0.7		α=0.69	
Basic dimension																						
	α=0.7		α=0.76		α=0.78		α=0.73		α=0.66		α=0.74		α=0.78		α=0.7		α=0.72		α=0.71		α=0.74	
House warm	0.32	-0.03	0.42	-0.06	0.44	-0.06	0.37	-0.14	0.32	-0.13	0.51	-0.3	0.53	-0.35	0.46	-0.36	0.52	-0.41	0.16	-0.05	0.17	-0.03
A week holiday	0.53	-0.18	0.59	-0.25	0.59	-0.27	0.51	-0.38	0.42	-0.32	0.55	-0.44	0.6	-0.48	0.54	-0.4	0.58	-0.52	0.52	-0.26	0.54	-0.29
New furniture	0.5	-0.22	0.58	-0.28	0.56	-0.23	0.56	-0.35	0.51	-0.22	0.44	-0.39	0.48	-0.37	0.5	-0.32	0.54	-0.4	0.46	-0.25	0.6	-0.29
New clothes	0.53	-0.12	0.63	-0.22	0.58	-0.1	0.48	-0.18	0.46	-0.16	0.51	-0.22	0.54	-0.3	0.45	-0.15	0.56	-0.37	0.59	-0.12	0.57	-0.18
Good diet	0.34	-0.06	0.41	-0.05	0.5	-0.03	0.42	-0.13	0.24	-0.08	0.42	-0.13	0.48	-0.28	0.32	-0.08	0.28	-0.17	0.52	-0.12	0.46	-0.13
Friends around	0.48	-0.07	0.54	-0.14	0.6	-0.17	0.47	-0.17	0.41	-0.16	0.52	-0.24	0.52	-0.3	0.44	-0.15	0.48	-0.28	0.62	-0.15	0.52	-0.17
House payments	0.18	-0.01	0.2	-0.08	0.25	-0.11	0.31	-0.15	0.25	-0.09	0.22	-0.12	0.36	-0.19	0.16	-0.06	0.1	-0.07	0.13	-0.05	0.32	-0.15
Secondary dimension																						
	α=0.53		α=0.5		α=0.53		α=0.58		α=0.66		α=0.61		α=0.68		α=0.59		α=0.71		α=0.58		α=0.58	
Car	0.38	-0.25	0.29	-0.15	0.34	-0.19	0.34	-0.19	0.44	-0.34	0.43	-0.17	0.53	-0.32	0.41	-0.24	0.52	-0.35	0.4	-0.2	0.4	-0.25
Tv	0.16	-0.03	0.13	-0.07	0.13	0.05	0.22	-0.01	0.23	-0.09	0.18	-0.01	0.24	-0.11	0.14	-0.01	0.28	-0.12	0.15	0	0.21	-0.08
Video recorder	0.42	-0.16	0.41	-0.1	0.45	-0.16	0.5	-0.15	0.53	-0.29	0.53	-0.17	0.52	-0.32	0.48	-0.21	0.58	-0.32	0.43	-0.24	0.46	-0.21
Micro wave	0.31	-0.12	0.33	-0.09	0.36	-0.14	0.4	-0.13	0.46	-0.24	0.32	-0.17	0.39	-0.18	0.44	-0.21	0.48	-0.3	0.41	-0.08	0.34	-0.1
Dishwasher	0.39	-0.23	0.3	-0.18	0.34	-0.2	0.36	-0.25	0.4	-0.35	0.34	-0.27	0.48	-0.29	0.32	-0.27	0.37	-0.32	0.5	-0.19	0.37	-0.24
Telephone	0.04	0.01	0.08	-0.04	0.08	-0.1	0.12	-0.09	0.26	-0.14	0.28	-0.09	0.3	-0.15	0.19	-0.13	0.4	-0.2	0.08	-0.01	0.15	-0.06
Housing facilities																						
	α=0.76		α=0.71		α=0.69		α=0.76		α=0.88		α=0.65		α=0.53		α=0.71		α=0.88		α=0.69		α=0.87	
Bath or shower	0.58	-0.04	0.54	-0.03	0.5	-0.1	0.63	-0.11	0.8	-0.07	0.52	-0.05	0.5	-0.19	0.6	-0.05	0.8	-0.21	0.6	-0.09	0.64	-0.07
Indoor toilet	0.64	-0.04	0.48	0.02	0.5	-0.07	0.55	-0.11	0.79	-0.04	0.42	-0.03	0.5	-0.21	0.53	-0.03	0.76	-0.2	0.48	-0.07	0.82	-0.07
Hot water	0.56	-0.03	0.57	-0.02	0.52	-0.09	0.58	-0.1	0.72	-0.07	0.43	-0.04	0.09	-0.05	0.45	-0.09	0.73	-0.22	0.44	-0.07	0.79	-0.08
Housing deterioration																						
	α=0.51		α=0.45		α=0.47		α=0.5		α=0.65		α=0.62		α=0.72		α=0.63		α=0.75		α=0.66		α=0.48	
Leaky roof	0.27	0.02	0.23	-0.02	0.26	-0.03	0.29	-0.05	0.37	-0.06	0.48	-0.07	0.57	-0.14	0.45	-0.08	0.54	-0.13	0.43	-0.04	0.24	0
Dampness	0.34	-0.05	0.32	-0.09	0.33	-0.03	0.34	-0.1	0.54	-0.12	0.45	-0.09	0.59	-0.18	0.48	-0.14	0.6	-0.16	0.5	-0.08	0.32	-0.04
Rot in windows	0.38	-0.02	0.28	-0.06	0.28	-0.07	0.33	-0.1	0.48	-0.11	0.36	-0.08	0.45	-0.15	0.38	-0.07	0.59	-0.19	0.5	-0.06	0.32	-0.06
Environment																						
	α=0.44		α=0.4		α=0.44		α=0.46		α=0.56		α=0.55		α=0.47		α=0.56		α=0.5		α=0.53		α=0.43	
Noise	0.32	-0.03	0.3	-0.01	0.31	0.01	0.36	-0.06	0.44	-0.04	0.38	-0.01	0.34	0.1	0.4	0.02	0.36	0.07	0.38	0.01	0.35	-0.04
Pollution or grime	0.27	0	0.2	-0.03	0.23	0	0.31	0.01	0.4	0	0.37	0.01	0.35	0.1	0.34	0.04	0.32	0.06	0.32	0.04	0.28	0
Shortage of space	0.26	-0.01	0.17	-0.04	0.21	-0.02	0.18	-0.04	0.19	-0.06	0.24	-0.12	0.16	-0.08	0.28	-0.04	0.23	-0.1	0.27	-0.02	0.19	-0.06
Not enough light	0.16	-0.01	0.12	-0.03	0.19	-0.06	0.16	-0.08	0.26	-0.06	0.26	-0.09	0.19	-0.07	0.24	-0.03	0.18	-0.13	0.25	0.01	0.11	-0.02
Crime	0.14	-0.03	0.23	-0.02	0.22	-0.03	0.23	0.02	0.34	-0.03	0.32	0.01	0.23	0.06	0.32	-0.02	0.25	0.08	0.26	0.01	0.21	-0.02

Year 2000. α = Cronbach's alpha. Column a: correlation with other items in dimension. Column b: correlation with equivalent income

Table 2: main statistics of the overall deprivation score.

	DK	NL	BE	FR	IE	IT	EL	ES	PT	AT	FI
average	4.92	6.53	6.56	8.19	6.06	10.32	16.54	10.28	19.22	6.83	7.67
% of zero	44.99	36.56	35.09	28.5	46.48	15.16	1.81	21.15	7.02	33.99	31.59
max	53.52	53.03	74.44	83.1	55.3	64.47	77.63	81.66	85.8	74	64.5

Year 2000

Table 3: correlation between equivalent income and different dimension of the deprivation score

	DK	NL	BE	FR	IE	IT	EL	ES	PT	AT	FI
Basic	-0.23	-0.29	-0.21	-0.37	-0.34	-0.41	-0.48	-0.39	-0.49	-0.27	-0.29
Secondary	-0.12	-0.2	-0.17	-0.22	-0.22	-0.13	-0.22	-0.23	-0.36	-0.11	-0.14
CLSD	-0.23	-0.3	-0.23	-0.37	-0.33	-0.39	-0.47	-0.37	-0.47	-0.27	-0.28
Housing fac.	-0.04	-0.02	-0.12	-0.13	-0.07	-0.07	-0.21	-0.08	-0.21	-0.1	-0.09
Housing det.	-0.02	-0.08	-0.05	-0.11	-0.14	-0.12	-0.2	-0.13	-0.22	-0.08	-0.08
Environment	-0.02	-0.06	-0.02	-0.04	-0.07	-0.06	0.03	0.00	-0.03	0.00	-0.01
Overall	-0.17	-0.27	-0.2	-0.32	-0.3	-0.33	-0.42	-0.31	-0.4	-0.23	-0.24

Year 2000

Table 4: Results from Random and Fixed Effects

	DK		NL		BE		FR		IE		IT	
	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE
Income	-0.04421***	-0.03081***	-0.35410***	-0.25195***	-0.27826***	-0.18261***	-0.40261***	-0.23838***	-0.05174***	-0.00742	-0.34492***	-0.14210***
Income^2			0.00696***	0.00507***	0.00450***	0.00322***	0.00638***	0.00459***			0.00443***	0.00206**
Income^3			-0.00004***	-0.00003***	-0.00002***	-0.00002***	-0.00004***	-0.00003***			-0.00002***	-0.00001
Pension	1.05928***	1.22649***	0.22944	0.48689**	-0.53025**	-0.43679*	-0.50910***	-0.27675	0.32968	0.16111	-0.49539***	-0.07848
Social transfer	2.39988***	1.49175***	2.11706***	1.80306***	1.44613***	0.14028	2.13766***	1.03862***	3.35561***	2.01574***	0.74018***	0.08645
Home ownership	-3.33334***	-2.77907***	-3.33372***	-2.45302***	-4.03662***	-2.74847***	-3.69636***	-2.70937***	-5.64630***	-1.90143***	-3.24661***	-1.74355***
Unemployed	2.72227***	3.49525**	4.65066***	2.10151**	8.35688***	6.32792***	7.13664***	3.74090***	7.34643***	7.93039***	4.86485***	-0.70649
Inactive	0.88156***	0.27941	1.46860***	3.11414***	2.00906***	1.73676*	0.61492**	0.95051*	3.04904***	3.42196***	-0.29341	-0.93993*
Higher education	-0.63704***	-0.44477	-1.07439***	0.3535	-1.77789***	-0.03714	-2.17893***	-1.03898***	-2.70886***	-1.43001*	-3.03984***	-0.595
Size family	0.50464***	0.25235*	0.83777***	0.37934***	0.40602***	-0.03184	1.03345***	0.33392***	0.72677***	0.39081***	1.47557***	0.82213***
Number children	-0.20851*	-0.16091	-0.13878**	-0.01345	0.20908*	0.09972	-0.44808***	-0.52343***	-0.22498	-0.12127	0.03494	0.26369**
Number children^2							0.09559***	0.16000***	0.16132***	0.13238***		
Health	-0.67635***	-0.07502	-0.92398***	-0.29848*	-1.97708***	-1.05498***	-2.15758***	-1.48838***	-3.05558***	-2.04495***	-2.46037***	-1.54073***
Divorced	0.27854	-0.42235	2.07532***	0.89579***	1.76637***	0.58084	1.34602***	1.05058***	2.57204***	-1.17037	0.57299	0.95878*
Widowed	-1.93385***	-1.31782***	-1.02588***	-1.07253***	-0.88096*	-0.72587	-0.98337***	-0.75422*	-1.64309**	-3.33710***	-0.91010**	-1.98856***
No married	0.36725*	1.13363***	0.65093***	0.67098***	0.73665**	-0.20446	0.89249***	1.04492***	1.08438**	-0.45024	2.12580***	2.07853***
Single	1.88962***	1.89199***			1.10126**	0.81009	0.51613*	-0.06622	1.39088**	1.80049*	1.80606***	2.20970***
No kids	0.19113	0.37929			-0.73408***	-0.49623*	-0.32889*	-0.29757	0.11926	0.48876	0.37353**	0.50495**
Lone	2.60622***	1.62883***			2.61640***	2.02458***	1.34517***	0.01272	2.54952***	2.94020***	1.39375***	0.26898
Age	-0.12783***	-0.08665***	-0.07410***	-0.07165***	-0.03655***	-0.00744	-0.03246***	-0.03215***	-0.08598***	-0.05458***	-0.12446***	-0.16894***
Age^2											0.00134***	0.00220***
Sex	1.71176***	2.61303***	2.99066***	2.74511***	0.72679*	0.59322	1.98396***	2.39695***	0.91601*	0.67661	0.92774**	1.27888**
Years1	1.55652***	1.85323***	0.62590***	0.80290***	1.39476***	1.61481***	2.11564***	2.31814***	3.43380***	4.30724***	1.59945***	2.35144***
Years2	0.59195***	0.87976***	0.32395***	0.49023***	1.61850***	1.81415***	1.30826***	1.47870***	2.34118***	3.06221***	0.84296***	1.42254***
Years3	0.65529***	0.88077***	0.54783***	0.66278***	0.80985***	0.96171***	1.04255***	1.22433***	2.35688***	2.95585***	0.63818***	1.18417***
Years4	-0.00895	0.15373	0.22359**	0.30537***	0.73052***	0.87351***	0.56023***	0.73146***	1.56178***	2.07270***	0.78134***	1.18399***
Years5	0.24047*	0.35818**	-0.18307*	-0.11325	0.32264*	0.40234**	0.74555***	0.88468***	0.86359***	1.21190***	0.69013***	0.93146***
Years6	0.18297	0.22379	-0.22599**	-0.18093*	0.25713*	0.27417*	0.14115	0.24744**	0.63802***	0.82633***	0.12152	0.25578**
Constant	13.51401***	10.30963***	14.32357***	11.43691***	16.94069***	12.38389***	18.37746***	15.35560***	16.13568***	9.62428***	19.20069***	14.77873***
Number of observation	28626	28626	57299	57299	34694	34694	70325	70325	38586	38586	99229	99229
Number of groups	6547	6547	12699	12699	7318	7318	15103	15103	9802	9802	19992	19992
Wald (RE) - F (FE)	5059.50	92.83	9021.26	126.78	4210.15	36.61	9908.44	105.00	8414.89	104.36	8759.07	71.77
p value	0	0	0	0	0	0	0	0	0	0	0	0
R^2 within	0.08698	0.09175	0.05818	0.0614	0.0303	0.03363	0.04414	0.04885	0.07266	0.08317	0.01902	0.02388
R^2 between	0.31063	0.26456	0.34221	0.27951	0.331	0.28615	0.34696	0.30603	0.39293	0.31211	0.30063	0.19264
R^2 overall	0.24797	0.21738	0.26756	0.22316	0.24983	0.21632	0.26584	0.23153	0.32162	0.25799	0.21033	0.14066
Hausman test (vs RE)		392.4***		749.85***		383.09***		839.53***		408.66***		1063.22***

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 4: Results from Random and Fixed Effects (ctd.)

	EL RE	EL FE	ES RE	ES FE	PT RE	PT FE	AT RE	AT FE	FI RE	FI FE
Income	-0.16764***	-0.04106***	-0.45296***	-0.20499***	-0.47099***	-0.26182***	-0.29140***	-0.16736***	-0.07214***	-0.02964***
Income^2			0.00825***	0.00451***	0.00733***	0.00549***	0.00509***	0.00316***		
Income^3			-0.00006***	-0.00003***	-0.00004***	-0.00003**	-0.00003***	-0.00002***		
Pension	-0.13505	0.22183	-0.43326***	-0.22736	-0.90791***	-0.35848*	-0.98809***	-0.39054*	0.1355	0.54914*
Social transfer	2.87715***	2.12154***	1.06822***	0.35118*	0.58513**	0.47618*	0.40179*	0.33561	1.78432***	1.14326***
Home ownership	-3.35838***	-2.33252***	-4.06910***	-2.55917***	-5.98926***	-3.61982***	-2.60866***	-1.18423***	-4.16711***	-3.01853***
Unemployed	5.46034***	12.65563***	4.73940***	3.30376***	7.83869***	10.82674***	6.52521***	8.46888***	3.44854***	2.55415***
Inactive	0.83012**	1.63884	2.08977***	2.96182***	0.84703**	0.06431	0.13096	-0.75719	1.02217***	2.21498***
Higher education	-6.35464***	-4.35194***	-4.53638***	-1.03553*	-6.14697***	0.57106	-2.61707***	-3.01277***	-0.96274***	-0.23467
Size family	1.31582***	0.82414***	1.28700***	0.52865***	1.48021***	0.86560***	0.53341***	0.0605	0.56429***	0.38944**
Number children	-0.87151***	-0.56661*	0.37762***	0.42162***	0.67939***	0.44094***	0.30340***	0.22388*	0.24417**	0.17051
Number children^2	0.24878**	0.16194								
Health	-2.94218***	-2.06344***	-2.94458***	-1.88952***	-2.46387***	-1.54681***	-1.59627***	-0.96821***	-1.34814***	-0.58381**
Divorced	2.97480***	2.45206**	3.13075***	1.58833***			0.96266***	-0.26479	0.87905***	-0.319
Widowed	-1.05723	-0.16569	1.17696***	-0.04026			-0.17892	-0.66936	-1.73870***	-1.20504*
No married	2.19537***	1.69174*	2.65639***	2.48841***			0.75252***	0.29129	0.92173***	0.72856**
Single	1.32101	0.81938			4.08649***	0.69469			1.16397***	1.41530**
No kids	-0.00515	0.41066			1.32583***	1.16657***			-0.14288	0.24133
Lone	1.99472*	1.17809			3.66706***	0.02555			1.83080***	1.43698**
Age	-0.18680***	-0.0236	-0.10593***	0.01165	-0.20391***	-0.04701	-0.00942	0.01666	-0.08393***	-0.07644***
Age^2	0.00218***	0.00036	0.00099***	0.00035	0.00294***	0.00148***				
Sex	2.11582***	1.13666	1.55744***	2.03004***	1.08568*	3.26781***	1.87511***	1.92411***	2.02620***	2.16937***
Years1			5.58160***	6.43623***	5.16473***	5.86686***	1.48913***	1.61410***	1.83654***	1.99163***
Years2	3.91657***	3.85182***	3.92579***	4.67373***	4.01867***	4.64191***	1.19494***	1.37469***	1.27968***	1.44349***
Years3	3.08977***	3.12257***	3.64260***	4.36418***	3.05522***	3.59790***	0.81031***	0.97828***	0.73806***	0.84983***
Years4	2.55069***	2.55506***	3.24460***	3.81159***	2.82450***	3.27958***	0.34332***	0.46044***	0.39157***	0.41464***
Years5	1.13506***	1.16765***	1.80665***	2.15593***	2.16340***	2.46855***	0.28830**	0.33214***		
years6	1.25156***	1.23581***	1.27542***	1.39807***	1.22608***	1.38209***				
Constant	26.57405***	19.95774***	20.68178***	11.84257***	26.48698***	18.79281***	14.31983***	11.23720***	14.77646***	11.52071***
Number of observation	56442	56442	91233	91233	73581	73581	35431	35431	28084	28084
Number of groups	12744	12744	19390	19390	14233	14233	8240	8240	8617	8617
Wald (RE) - F (FE)	6302.19	69.16	15662.06	289.93	10703.76	200.97	2640.72	33.03	4628.24	71.31
p value	0	0	0	0	0	0	0	0	0	0
R^2 within	0.03233	0.03808	0.07888	0.08833	0.06618	0.07519	0.02167	0.02605	0.07053	0.07465
R^2 between	0.28918	0.2191	0.34926	0.22408	0.34744	0.22909	0.2176	0.14077	0.27885	0.247
R^2 overall	0.203	0.15661	0.24976	0.16884	0.28427	0.19651	0.15663	0.10521	0.22495	0.19868
Hausman test (vs RE)		272.25***		1144.08***		1102.12***		405.74***		415.52***

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 5: Results from Random and Fixed Effects with income lagged and past unemployment variables

	DK RE	DK FE	NL RE	NL FE	BE RE	BE FE	FR RE	FR FE	IE RE	IE FE	IT RE	IT FE
Income	-0.03509***	-0.02893***	-0.36481***	-0.26439***	-0.26747***	-0.17842***	-0.40012***	-0.23813***	-0.03597***	-0.00464	-0.30018***	-0.13794***
Income^2			0.00807***	0.00568***	0.00456***	0.00320***	0.00701***	0.00471***			0.00493***	0.00224***
Income^3			-0.00005***	-0.00004***	-0.00002***	-0.00002***	-0.00004***	-0.00003***			-0.00003***	-0.00001*
Pension	0.96952***	1.21935***	0.12981	0.42421**	-0.58028**	-0.47578*	-0.65530***	-0.34349*	0.22377	0.12807	-0.52526***	-0.1482
Social transfer	2.37836***	1.48924***	2.04097***	1.77417***	1.35558***	0.10331	2.02979***	1.05739***	3.26816***	2.02695***	0.53037**	0.0074
Home ownership	-3.24356***	-2.74526***	-3.10903***	-2.33594***	-3.91270***	-2.69788***	-3.57257***	-2.65026***	-5.38917***	-1.87899***	-3.12281***	-1.74746***
Unemployed	2.27326***	3.47512**	4.10115***	1.81076*	7.52944***	5.71800***	5.56728***	2.82195***	6.19436***	8.11725***	3.50586***	-0.74421
Inactive	0.29154	0.39639	0.87238***	3.03037***	1.01433**	1.01698	-0.91255***	-0.09923	1.64482***	3.78066***	-0.80653***	-0.42086
Income lagged	-0.03162***	-0.02106***	-0.09223***	-0.06789***	-0.05317***	-0.02633***	-0.08379***	-0.04125***	-0.03119***	-0.01467***	-0.24491***	-0.13213***
Income lagged^2			0.00059***	0.00042***	0.00029***	0.00018***	0.00033***	0.00016***			0.00251***	0.00134***
Income lagged^3			-0.00000***	-0.00000***	-0.00000***	-0.00000***	-0.00000***	-0.00000***			-0.00001***	-0.00000***
Past unemployed	0.64453***	-0.08601	0.61901***	0.19509	1.07021***	1.33462*	1.99714***	2.09696***	1.91037***	-0.60204	0.62577***	-0.91224*
Higher education	-0.55646***	-0.38065	-0.95744***	0.394	-1.62346***	-0.05885	-1.82829***	-0.87612**	-2.54027***	-1.36190*	-2.42092***	-0.59441
Size family	0.63232***	0.34231**	0.98941***	0.53085***	0.55772***	0.04238	1.13490***	0.42938***	0.79997***	0.44795***	1.72071***	1.05247***
Number children	-0.29831***	-0.20871	-0.25307***	-0.10506	0.11662	0.05831	-0.48250***	-0.59223***	-0.29762*	-0.17225	-0.17959**	0.1316
Number children^2							0.09267***	0.16944***	0.16163***	0.13479***		
Health	-0.67254***	-0.07814	-0.90019***	-0.28247*	-1.95608***	-1.04386***	-2.14689***	-1.48288***	-3.09317***	-2.07419***	-2.38726***	-1.52644***
Divorced	0.34446	-0.34612	2.01002***	0.84657***	1.83313***	0.61523	1.34470***	1.07299***	2.40750***	-1.19221	0.84188*	1.06261*
Widowed	-1.90303***	-1.29365**	-1.00540***	-1.01378**	-0.632	-0.60017	-0.89448***	-0.77670*	-1.56507**	-3.38391***	-0.41956	-1.78444***
No married	0.2932	1.10520***	0.53876***	0.54514**	0.75376**	-0.25178	0.88142***	0.98746***	1.15790**	-0.46943	2.24926***	2.00445***
Single	1.65301***	1.74110***			0.85439*	0.65956	0.10112	-0.28539	1.20546*	1.74050*	0.75695*	1.67737***
No kids	0.10792	0.32789			-0.79927***	-0.51703*	-0.43248*	-0.37134*	0.07476	0.47608	0.17833	0.37150*
Lone	2.36407***	1.45233***			2.34141***	1.93795***	1.09503***	0.04979	2.53683***	3.07744***	1.14170**	0.36381
Age	-0.12407***	-0.08170	-0.06966***	-0.06196***	-0.03167***	-0.00457	-0.01373*	-0.02620*	-0.07777***	-0.05545***	-0.12481***	-0.18577***
Age^2											0.00139***	0.00235***
Sex	1.70202***	2.53759***	2.74580***	2.45243***	0.67458*	0.51233	1.89614***	2.28857***	1.00026*	0.4678	0.60218*	0.80515
Years1	1.51713***	1.83215***	0.59412***	0.77634***	1.40973***	1.62054***	2.06367***	2.26427***	3.41057***	4.20369***	1.39866***	2.11629***
Years2	0.57558***	0.87010***	0.24159**	0.42115***	1.63217***	1.82144***	1.35247***	1.48191***	2.34303***	2.97766***	0.75172***	1.27724***
Years3	0.63593***	0.86811***	0.44649***	0.58252***	0.79502***	0.96115***	1.11050***	1.23501***	2.31635***	2.86547***	0.56630***	1.05144***
Years4	-0.02336	0.14109	0.19061**	0.27872***	0.73010***	0.87112***	0.58982***	0.72229***	1.53210***	1.99729***	0.62638***	1.03238***
Years5	0.22344	0.34620**	-0.21450**	-0.1357	0.31043*	0.39973**	0.76800***	0.88239***	0.85136***	1.16627***	0.60658***	0.83846***
years6	0.1666	0.21247	-0.22600**	-0.18172*	0.2472	0.27023*	0.1522	0.24114**	0.64827***	0.80853***	0.06718	0.20980*
Constant	14.24674***	10.35597***	15.86225***	12.19581***	18.14232***	13.68417***	20.48290***	17.56303***	17.27257***	9.37782***	21.73159***	15.95103***
Number of observation	28613	28613	57165	57165	34613	34613	69970	69970	38558	38558	98406	98406
Number of groups	6544	6544	12677	12677	7313	7313	15061	15061	9801	9801	19939	19939
Wald (RE) - F (FE)	5177.58	86.93	9423.64	113.45	4299.08	32.10	10503.45	94.20	8681.21	97.45	10394.26	73.76
p value	0	0	0	0	0	0	0	0	0	0	0	0
R^2 within	0.08819	0.093	0.06145	0.06446	0.03076	0.03411	0.0464	0.05053	0.07387	0.0839	0.02453	0.02832
R^2 between	0.3176	0.26673	0.35006	0.28324	0.33542	0.2838	0.35779	0.31904	0.40029	0.31084	0.32661	0.25328
R^2 overall	0.25232	0.21856	0.27453	0.22612	0.25423	0.21595	0.2787	0.24734	0.32997	0.25639	0.23343	0.18374
Hausman test (vs RE)		237.86***		526.25***		428.57***		801.77***		399.22***		1179.13***

* p<0.05, ** p<0.01, *** p<0.001

Table 5: Results from Random and Fixed Effects with income lagged and past unemployment variables (ctd.)

	EL RE	EL FE	ES RE	ES FE	PT RE	PT FE	AT RE	AT FE	FI RE	FI FE
Income	-0.11360***	-0.03291***	-0.40582***	-0.20084***	-0.37800***	-0.22694***	-0.27621***	-0.16879***	-0.04392***	-0.02751***
Income^2			0.00906***	0.00482***	0.00741***	0.00557***	0.00518***	0.00324***		
Income^3			-0.00007***	-0.00004***	-0.00005***	-0.00004***	-0.00003***	-0.00002***		
Pension	-0.06057	0.25085	-0.34343**	-0.18797	-0.86968***	-0.39044*	-1.04117***	-0.41112*	0.0421	0.55206*
Social transfer	2.67370***	2.10524***	1.13399***	0.41329**	0.60742**	0.46613*	0.35697*	0.29903	1.76986***	1.12818***
Home ownership	-3.33318***	-2.31079***	-3.77341***	-2.47454***	-5.86165***	-3.53428***	-2.51743***	-1.16500***	-3.96632***	-2.94096***
Unemployed	2.77113***	13.16869***	2.71517***	3.05120***	6.72421***	11.67211***	4.42226***	7.74280***	2.76491***	3.09424***
Inactive	-1.33594***	0.69944	0.33929	2.76838***	-0.22985	0.58344	-1.98181***	-1.50924*	0.24472	2.87021***
Income lagged	-0.13742***	-0.08622***	-0.23015***	-0.16268***	-0.37368***	-0.24894***	-0.08959***	-0.04166***	-0.06825***	-0.04593***
Income lagged^2			0.00150***	0.00149***	0.00471***	0.00372***	0.00086***	0.00051***		
Income lagged^3			-0.00000***	-0.00000***	-0.00002***	-0.00001***	-0.00000***	-0.00000***		
Past unemployed	2.90797***	0.56133	2.35042***	0.03437	1.62450***	-1.02201*	2.59074***	1.21027*	0.86363***	-2.02320***
Higher education	-5.39828***	-4.29519***	-3.36298***	-1.00373*	-5.11521***	0.75254	-2.38548***	-2.88625***	-0.82480***	-0.08939
Size family	1.70049***	1.15064***	1.70953***	0.86330***	1.91825***	1.17222***	0.71666***	0.11697	0.75656***	0.54249***
Number children	-1.13710***	-0.73003**	0.07943	0.24359**	0.29301***	0.23584*	0.13181	0.19192	0.10525	0.10062
Number children^2	0.26030***	0.17860*								
Health	-2.90814***	-2.07407***	-2.85431***	-1.84450***	-2.33753***	-1.50741***	-1.59867***	-0.98555***	-1.32580***	-0.57461**
Divorced	2.86498***	2.20883*	3.07411***	1.67129***			0.99612***	-0.22552	0.84709***	-0.3513
Widowed	-0.77904	0.04058	1.37810***	-0.06485			-0.11474	-0.66884	-1.80522***	-1.14900*
No married	2.25871***	1.46068	2.76101***	2.17861***			0.70228***	0.26544	0.83124***	0.69120*
Single	1.14653	0.54743			3.42127***	0.40969			0.91285**	1.27086**
No kids	-0.04881	0.4331			1.04585***	1.04284***			-0.19502	0.22552
Lone	1.56209*	0.73389			3.50215***	0.15055			1.65979***	1.31859**
Age	-0.12613***	-0.00064	-0.05738**	0.00875	-0.19432***	-0.05127	-0.00613	0.01747*	-0.07521***	-0.07561***
Age^2	0.00165***	0.00017	0.00068**	0.00037	0.00277***	0.00146***				
Sex	2.36122***	1.08454	1.33036***	1.62501***	0.81163	2.76067***	1.60899***	1.79646***	2.01360***	1.86581***
Years1		(dropped)	5.40002***	6.12404***	4.78541***	5.53011***	1.50380***	1.61274***	1.77095***	1.87001***
Years2	3.95977***	3.80899***	3.76610***	4.39624***	3.68193***	4.34574***	1.21384***	1.37340***	1.21549***	1.34763***
Years3	3.07452***	3.05671***	3.45310***	4.08724***	2.78376***	3.35010***	0.79733***	0.96967***	0.70518***	0.79658***
Years4	2.48739***	2.47553***	2.96753***	3.50978***	2.58552***	3.07425***	0.31473**	0.45547***	0.37210***	0.38074***
Years5	1.16521***	1.15679***	1.54652***	1.91529***	1.96877***	2.31181***	0.25992**	0.32954***		
years6	1.22455***	1.20823***	1.13031***	1.28282***	1.19254***	1.33300***				
Constant	27.48866***	20.36276***	21.88810***	13.51132***	29.64726***	19.66620***	17.12018***	12.69294***	15.43010***	10.76922***
Number of observation	56142	56142	90893	90893	73291	73291	35390	35390	28073	28073
Number of groups	12731	12731	19362	19362	14206	14206	8239	8239	8617	8617
Wald (RE) - F (FE)	7536.13	74.48	18209.93	263.75	11801.59	181.73	2990.70	28.87	4846.21	67.77
p value	0	0	0	0	0	0	0	0	0	0
R^2 within	0.04045	0.0443	0.08627	0.09361	0.07131	0.07933	0.02253	0.02693	0.0718	0.07723
R^2 between	0.32261	0.2696	0.38643	0.23145	0.37181	0.27124	0.2399	0.1601	0.2896	0.22018
R^2 overall	0.23269	0.19639	0.28155	0.21053	0.30679	0.23083	0.1752	0.12022	0.23367	0.18057
Hausman test (vs RE)		296.83***		1263.48***		1243.04***		406.21***		242.54***

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Annex I

Questions in the ECHP survey

BASIC DIMENSION
Can the household afford…

… keeping its home adequately **warm**?
… paying for a week's annual **holiday** away from home?
… replacing any worn-out **furniture**?
… buying **new**, rather than second-hand, **clothes**?
… eating **meat, chicken or fish (good diet)** every second day?
… having **friends or family** for a drink or meal at least once month?
… paying scheduled rent/mortgage and utility bills of the **house**?

SECONDARY DIMENSION
Affordability of…

… **car**
… **tv**
… **video recorder**
… **micro wave**
… **dishwasher**
… **telephone**

HOUSING FACILITIES DIMENSION
Does the dwelling have…

… **bath or shower**?
… indoor flushing **toilet**?
… **hot** running **water**?

HOUSING DETERIORATION DIMENSION
Does the accommodation have…

… leaky **roof**?
… **damp** walls, floors, foundations…?
… **rot** in window frames or floors?

ENVIRONMENT DIMENSION
Does the accommodation have…

… **noise** from neighbours?
… shortage of **space**?
Is there any **pollution, grime**, or other environmental problem…?
Is the accommodation **too dark / not enough light**?
Is there **crime or vandalism** in the area?