Country differences in material deprivation in Europe.

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Abstract

This paper evaluates to what extent differences between countries in the composition of their population and in structural characteristics can explain country differences with respect to material deprivation. Our study aims to advance research on the structural dimension to the predominantly individually oriented study field of material deprivation. To facilitate an integrated approach of individual and structural context dimensions we took advantage of multilevel techniques to test differences among a large number of countries in the intensity of material deprivation. We make use of the European Union Survey on Income and Living Conditions. From our analyses, we can conclude that structural effects seem to be more relevant than individual effects to explain country differences in material deprivation.

Keywords: Material Deprivation, Multilevel Analysis, European Union Survey on Income and Living Conditions**.**

JEL Codes: J16, I32, O57

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1. Introduction

Nowadays, it is widely agreed that poverty has a multidimensional nature. Individuals with the same income may suffer different deprivation levels. They can experience poorer living standards due to the effects of accumulated resources, employment status, educational level, health conditions, housing tenure, non-cash income and social benefits. Therefore, being poor does not simply imply low monetary resources. To reflect that idea, related literature use the concept of multiple deprivation, often defined as a situation that reflects low levels of living standards and can be derived from a set of nonmonetary indicators (Nolan and Whelan 1996, Atkinson et al. 2002). (NOTA: No pondría datos sobre privación como hicimos en pobreza, donde el índice esta consensuado. En privación hay muchas alternativas, y no hemos definido todavía la nuestra. Se puede después en el descriptive statistics decir otros números que le sale a Figari por ejemplo)

The main goal of this paper is to examine whether the country differences with respect to material deprivation can be explained by differences between the countries in the composition of their populations (micro-level or individual perspective) or by structural characteristics of the countries (macro-level or structural perspective). In order to answer our question, we will make use of the European Union Survey on Income and Living Conditions (from now on EU-SILC) 2008.

As Ayala et al. (2010) state, several alternative proposals have recently appeared in the literature that attempt to measure the level of multidimensional deprivation in a society. The measurement of material deprivation involves a set of methodological decisions which may partly condition the results, starting with the definition of deprivation. As we will describe later on, we will adopt the concept of "enforced lack", emphasizing the difference between people's preferences and constraints. We use a measure of the intensity of deprivation instead of a index to determine whether or not the individual suffers material deprivation, to avoid the non robust choice of the threshold. We calculate a mean index indicating the average number of lacked items, without defining any threshold.

Usually, in the material deprivation analyses, the living standards are considered at the household level, assuming that all individuals in one household are equally deprivated. While the literature of poverty has questioned the 'unitary household assumption' to study the material deprivation issues it seems more appropriated. So, for

the individual perspective, we will consider the "head".... FALTA PONER ALGO MAS sobre el tema del hogar, nivel de refr. Figari (2010) (Berthoud and Bryan 2011),

Moreover, there is no consensus in the literature in terms of measurement issues. Contrary to monetary poverty analysis, there is no a commonly accepted threshold to determine whether an individual is deprivated or not. An alternative approach in the literature is to consider an index of the intensity on material deprivation, which avoids the problem of the robust choice of the threshold. Still, there are several choices for this index, we will discuss later on. In the present study, we will consider rather than being or not deprivated, the intensity of deprivation.

In the existing literature, two distinct approaches have been considered to explain material deprivation across different countries: micro and macro-level approaches. The former approach effectively scrutinizes the precise mechanisms of individual deprivation, but omits the information for the country characteristics, although, as pointed out by Brady et al. (2009) such macro-level differences manifest at the individual level. Alternatively, macro-level studies may suffer from a black-box problem of causal inference because micro-level mechanisms are unobserved (Goldthorpe, 2000). Moreover, macro-level studies can only control for individual characteristics such as family structure at the aggregate level (e.g., the rate of old people). Given these considerations, there is a clear need for research that combines micro and macro-level.

In this sense, our study adds to the existing research by analysing the country differences in deprivation by explicitly adding a structural dimension (contextual effects) to the predominantly individually oriented study field of deprivation. Our analysis method took advantage of multilevel techniques especially suited for the analysis of such mixed-level data. To our knowledge, our study is among the firsts to estimate a multilevel model of deprivation across affluent democracies (Dewilde 2008; Figari, 2010). The main differences of those studies with ours are either the estimation methodology or the inclusion of gender considerations.

The paper is structured as follows: next section revises some significant papers on the study of material deprivation. Section 3 reviews important hypothesis from the individual and structural context perspectives. Section 4 describes the data used and the variables introduced in the study. The method of analysis is explained in section 5. Section 6 presents and discusses the results of our analysis. The final section concludes.

2. Background

There is considerable literature on cross-national differences in material deprivation, but very little has been published on cross-national differences in the intensity of material deprivation. As pointed out in the introduction, the existing literature has followed two different approaches: the micro and macro-level of the analysis. Concerning those works that focus on the analysis of country differences in material deprivation from a micro-level perspective, the most extended in the literature, we would like to mention the following studies.

Whelam et al. (2004) analyze in what way the determinants of poverty and deprivation differ. They use variables at the individual level. They find evidence that suggest that persistent deprivation is structure more by factors related to socio-economic disadvantage, whereas persistent income poverty is influenced by factors which influence the income stream. However they also have a substantial se of shared influences, of which the most important are the labour market precarity, education and manual class position.

Boarini and D'Ercole (2006) review the evidence and research on material deprivation in OECD countries. Although this study is based on summary statistics rather than on micro records, they study the influence of the individual characteristics into the probability of experiencing material deprivation.

Hallerod et al. (2006) measure the degree to which people actually suffer deprivation when it comes to consumption of goods and services. He considers Britain versus Sweden and Finland. Traditionally it is found that Finland and Sweden display less deprivation, since the income distribution is more even, the poverty rate is much lower, their welfare state is more comprehensive, the unemployment insurance is larger, and the number of low-paid, part-time jobs is lower. They use a Tobit analysis, using individual variables as explanatory variables. Their results alter the commonly held view that deprivation is a bigger problem in Britain than in both Finland and Sweden.

Ayala et al (2010) study multidimensional poverty estimating the different logit models for each region and for the nation as a whole. They consider individual characteristics to explain the relationship between deprivation and poverty. As a result of the estimates carried out, the confirmation of a weak relationship between both phenomena stands out. An analysis of regional rates shows that this result is not an exclusive characteristic of the national aggregate and that this phenomenon is reproduced in most of the regions.

There are, however, differences among the regions and a definite underlying pattern of statistical association between both phenomena does not seem to appear in the different territories.

Figari (2010) analyses the relationship between deprivation, income and other individual dimensions over time, in eleven European countries. The determinants of deprivation are analysed by using fixed effects models for each country separately. Despite the large differences in deprivation levels, the determinants of deprivation are shown to be quite similar across European countries. He finds that changes in income and deprivation do not strictly coincide and he highlights the importance of employment status, type of income sources, higher education and home ownership in explaining the deprivation level. In this study deprivation differentials across countries are explained by the average level of a number of socio-economic characteristics (e.g. income, number of family members) and their strength in reducing deprivation.

Concerning the studies from the macro-level perspective, a few works analyze a cross-section. We would like to point out the article by Whelam et al. (2008). Their analysis of patterns of deprivation across countries, individually and grouped into welfare regimes, brings out the importance of taking the multidimensional nature of material deprivation into account. The contrast between countries and welfare regimes varies across the three dimensions, in a manner that produces rather different profiles. There was more cross-country variation in consumption deprivation than in the other two dimensions, with mean levels being lowest in the Social Democratic and Liberal regimes, slightly higher in the Corporatist one, higher again in the Southern European countries, but very much higher in the Post-Communist countries. With the household facilities dimension the main differentiation was that the Post-Communist countries had much higher levels than the rest, while the extent of cross-country variation in neighbourhood environment was quite low.

The need for research that combines micro and macro-levels becomes evident. Layte et al. (2001) isolate some characteristics that should be associated with deprivation across countries. They distinguish between two broad factors: the needs and the resources. The former refers to the material obligations imposed on households by household structure, marital status, number of children, stage of the life-cycle and key life events. The former set comprises those factors which impact on the level of resources that a household can generate through participation in the labour market, characterized by social class, educational qualifications and labour-market experience

are just three of the main indicators of one's ability to command remuneration in the labour market. They use OLS regression techniques with a set of dummies for countries. They find that although both set of factors contribute independently to our ability to predict deprivation, it is the resource factors that are crucial in reducing country effects. The need for research that combines micro and macro-levels becomes evident. Problem with the clusters

Muffels and Fouarge (2003) focus on the role of institutional variations across countries by looking at the impact of country and welfare regime type differences. The use Tobit models to asses the impact of some individual variables together with some country variables. They find that the household needs, the head's socio-economic position and the lagged level of household income are undoubtedly the three factors explaining most of the variance in individual levels of deprivation. Inclusion of the country dummies does not change much to the estimates, but it does increase substantially the explanatory power of the model. Where the country indicators were replaced with regime-type dummies – it seems true that regime type effects can explain most of the country variance. Problem with the clusters

Dewilde (2008) evaluates to what extent between-country differences in the probability of being 'multidimensional' poor can be explained by a range of 'domain specific' indicators of welfare regime arrangements. To this end, a so-called micro-macro model is estimated, testing the 'independent' effect of institutions, as opposed to alternative explanations such as between-country differences in population composition and economic affluence. He estimates the effects of the micro- and macro-variables using a multinomial or generalised logit model. Opposite to our approach, he controls for the nesting of individuals within households and countries by using robust standard errors. He concludes that institutional arrangements do influence the risk of multidimensional poverty in the expected direction.

3. Theory

As pointed out in the introduction, in the related literature, there exist two alternatives to explain the intensity of material deprivation. The probability of experiencing material deprivation depends on a range of characteristics of individuals and the household where they live. Among those factors that are included into the individual perspective, we present some hypotheses that are commonly considered.

- Income Hypothesis. There is, in general, a weak correlation between personal income and the probability of experiencing different forms of material deprivation (Perry, 2002; Layte et al., 2001a; Whelan et al., 2001, and Figari, 2010). Despite this weak correlation, most analysis show that lower-income individuals are, on average, more likely to experience material deprivation than higher-income ones, with a more intense relationship over the lower ranges of income distribution. Boarini and D'Ercole (2006) find that the probability of experiencing material deprivation is twice as large among people in the lower quartile of the income distribution as for those in the middle quartile, although these differences varies a lot among countries.

- Gender Hypothesis. Most studies find that women are generally more deprived than men, although this gender gap remains largely unexplained. In this sense, Halleröd *et al.* (2006), for instance, point out that unemployed women scored lower on the weighted deprivation index compared with unemployed men. Nevertheless, they admit that even though this might be interpreted as an example of men's larger dependency on the market and women's larger dependency on the family, it does not offer an explanation as to why women are more deprived than men.

- Age Hypothesis. The relationship between age and deprivation varies across countries, with some countries displaying deprivation that declines monotonically with age but others featuring some forms of deprivation increasing among the elderly. In Europe, people aged less than 24 are more likely to experience material deprivation that persons of other ages (Eurostat, 2002). Feijten and Mulder (2005) find that young people are confronted with more housing deprivation, a situation which usually gradually improves over their life-course.Results are more varied when looking at the elderly. While Lollivier and Verger (1997) find that the elderly have a lower probability to experience material deprivation than other age groups; Tsakloglou and Papadopoulos (2000) find that in some countries where retired individuals are over-represented among those experiencing poor housing conditions, as well as financial difficulties, the elderly experience higher probability of material deprivation. Muffels and Fouarge (2004) and Saunders and Adelman (2005) find that the elderly experience less deprivation than expected on the basis of their income. As pointed out by Dewilde (2008), resources and needs vary over the life course and are partly dependent on earlier life-course experiences. The negative relationship between age and deprivation can be related to the individual's position on the housing market (in several countries most elderly are outright owners and can thus get by on a smaller income), but also to

the fact that older people have better budgeting skills (age effect) or grew up in an era when people had less material demands (cohort effect). Moreover, in many countries there exist old age benefits that can alleviate the material deprivation of elderly. Relative to other groups, welfare recipients have lower odds of experiencing multiple hardship, but higher odds with respect to two other measures of financial stress (Bray, 2001).

- Employment Status Hypothesis. This hypothesis refers to the role of the labour market in preventing and resolving situations of deprivation. Unemployed and inactive persons or working few hours face a high likelihood of deprivation. Meanwhile, households containing one o more worker, self-employed or employee, generally present lower deprivation scores (see, among others, Eurostat 2002; Berthoud and Bryan 2010).

- Household Structure Hypothesis. The relationship between material hardship and socio-economic characteristics of households is similar across countries. In all countries, people living alone are especially vulnerable to material deprivation (see for example Boarini and D'Ercole, 2006, for a summary). In all countries, single parents consistently report a higher probability of material deprivation. In Europe, lone parents have greater odds of lacking basic consumer durables and of having more difficulties in making ends meet: when aggregating the various deprivation items into a synthetic index, lone parents face the highest risk of disadvantage in five European countries (Tsakloglou and Papadopoulos, 2000). Additional adults other than the partner of the householder, however, increase deprivation, according to Berthoud and Bryan (2010). Less clear is the relationship between the number of children in the household and the probability of material deprivation, although analyses in which families with dependent children tend to have higher deprivation scores predominate in the literature, with stronger effect for larger number of children.

- Human Capital Hypothesis. A result that is highly consistent across all countries is that less educated people have higher probabilities of experiencing material deprivation. Boarini and D'Ercole (2006) points out that less educated people have higher probabilities of experiencing material deprivation. In Europe (based on ECHP data for 1997), low education of the household head is associated to very high odds of deprivation. In this line, Whelan et al. (2004) remind that educational level is likely to have a large impact on available resources.

- Health Hypothesis. In all countries people affected by sickness and disability record much higher levels of material deprivation than the rest of the population. A key factor of this higher prevalence of privation among sick and disabled people is extra costs of living associated with these situations (Zaidi and Burchardt, 2005). In Europe, persons affected by sickness and disability record much higher levels of deprivation in all dimensions, while sick persons figure among those with the biggest difficulties in making ends meet (Tsakloglou and Papadopoulos, 2000)

- Home Tenure Hypothesis. Home tenure also helps to predict the likelihood of material deprivation. There is scarce controversy on the relationship between deprivation level and home tenure. In all countries home-owners, particularly those who are not paying a mortgage are less likely to report material deprivation than renters. In all countries, home-owners are less likely to report material deprivation than renters (Bray, 2001; Engeland and Lewis, 2004).

In the existing literature, some other hypotheses, that are either based on those presented above, or mix some of the arguments, are presented. For example, Engeland and Lewis (2004), or Lee and Murie, 1997 also highlight that deprivation is partly concentrated geographically, especially in areas characterised by high unemployment, violence and vandalism.

Rather than aggregate poverty, a multilevel analysis assesses the effect of both, individual and structural context characteristics, on an individual's deprivation intensity. Therefore, apart from those individual and household factors, the cross-national differences in material privation can be partly explained by variations in policies and institutional designs, as well as dissimilarities in the socio-economic and socio-cultural context. We present some hypotheses that are commonly considered in the literature that cover the structural context perspective.

- Welfare State Hypothesis. Muffels and Fouarge (2003), Whelan et al. (2008) and Dewilde (2008), introduce in their analysis welfare regime type effects. They distinguish between liberal, socio-democratic and southern regimes, and adopt an approach which regimes represent a particular mode of policy intervention, a particular ser of intervention strategies, policy tools and a particular design of the regulatory or institutional framework. As the transfer system is an important component of the welfare regime, they include two indicators referring to income replacement, and more specifically, the prevention of privation. A first indicator is the OECD 'summary' unemployment replacement rate. The second indicator specifically

concerns the poor population, and refers to the social assistance benefit level (couple with 2 children). Controlling for compositional differences between countries and the level of economic affluence, we expect to find a negative relationship between the extent of income replacement and the risk of deprivation.

- <u>Family support hypothesis</u>. Regarding measures indicating the public support for families with children, they allow mothers to work and thus make an often vital contribution to the household economy (Jenkins 2000; Dewilde 2006), or by providing financial support and/ or cheap services, thereby partly lessening the financial burden of children.

- <u>Labor Market Hypothesis</u>. Following Dewilde (2008) we include a first indicator of labour market flexibility strictly refers to policies. The OECD employment protection legislation index summarises the strictness of regulations concerning regular employment, temporary employment and collective dismissal. However, as we saw above that inflexibility in some countries leads to the development of informal adaptations by employers and individuals, we also include an outcome-indicator as macrolevel determinant, the % of employees on a fixed-term contract. We expect that the risk of multidimensional poverty is higher in countries with less strict employment protection legislation and a higher number of employees on a fixed-term contract .

- <u>Educational Hypothesis.</u>

- <u>Gross Domestic Product Hypothesis</u>.

- <u>Inequality Hypothesis</u>. Gini o q10/q90

- <u>Population composition Hypothesis</u>. The percentage of elderly.

- <u>Industrial Hypothesis</u>. El peso de la industria mayor menos deprivation??

- <u>Competitiveness Hypothesis</u>. Competitividad y oportunidades de negocio??

To sum up, in this paper we analyze the causes of differences in the intensity of material deprivation between European countries. Consequently, our goals are:

- To study whether differences in the composition of population affect those country differences in material deprivation (individual perspective or micro-level). This goal consists of testing the Income Hypothesis, the Gender Hypothesis, the Age Hypothesis, the Employment Status Hypothesis, the Household Structure Hypothesis, the Human Capital Hypothesis, the Health Hypothesis and the Home Tenure Hypothesis.

- To determine whether differences in country characteristics influence those country differences in the material deprivation (structural perspective or macro-level). This goal consists of testing the Welfare State Hypothesis, the Family support hypothesis, the Labor Market Hypothesis, the Educational Hypothesis, the Gross Domestic Product Hypothesis, the Inequality Hypothesis, the Population composition Hypothesis, the Industrial Hypothesis and the Competitiveness Hypothesis.

4. Data and measurement issues

To reach our goals, we use European Union Survey on Income and Living Conditions (from now on EU-SILC), that is an international database that consists of country specific comparable data. Specifically, to perform our analysis, we work with data for year 2008. The static analysis, based on year 2008, is carried out over 57,804 observations of individuals living in households with one adult from 27 different countries.

Definition of material deprivation

The measurement of material deprivation involves a set of methodological decisions which may partly condition the results, starting with the definition of deprivation. The seminal contribution of Townsend (1979) focuses on people who were incapable of "living a decent life" and simply regards the lack of a necessity as implying deprivation. Contrary to that idea, Mack and Lansley (1985) develop the concept of "enforced lack", emphasizing the difference between people's preferences and constraints. To exclude the lifestyle preferences from the concept of deprivation, the recent related literature is often based on the enforced lack of items to reflect "deprivation" (see among others, Nolan and Whelan 1996, 2007).

Once we adopt this approach, another issue arises with no consensus in the literature, that is, the selection of the items to measure material deprivation. Some important factors, that determine the selection of those items, are not only the specific survey used but also the degree of subjectivity that numerous deprivation items possess. Usually in the literature we find that items are grouped in a small number of subsets, according to the meaning of the underlying characteristics that provide internal consistency to each subset. For instance, Whelan *et al*. (2001), with data from the ECHP, group 24 items into five dimensions labelled basic deprivation, secondary deprivation, housing facilities, housing deterioration, and environmental problems. Guio

(2005, 2009), using data from EU-SILC, groups the items into only three dimensions: economic strain, durables and housing.

Another relevant issue concerning measurement of deprivation is how to weight the items. On the one hand, Townsend (1979), Mack and Lansley (1985) and Mayer and Jencks (1989) consider that each item receives equal weight. Brandolini (2008) points out that the main advantage of this approach is to make the interpretation of the results simpler; and its main drawback is that no discrimination is made about the items and that there can be a double counting when items overlap. There exists an alternative approach in which different weights could be considered according the relative importance of the items. In this line, some analysis use a prevalence weighting, establishing the weights in terms of the proportion of persons who possess the respective items[1], (i.e. forms of deprivation which affect only a small share of the population are given a larger weight than those that are more common). These weights are calculated such that they vary across countries and times. Other approach is to employ a consensus weighting, taking into account social views on what is more desirable or even necessary. When dealing with European Union studies, they use the Eurobarometer data. Guio (2009) and Bossert et al. (2009), compare the results with weights based on prevalence rate and on consensus rate. They find that ..

As Ayala et al. (2010) state, several alternative proposals have recently appeared in the literature that attempt to measure the level of multidimensional deprivation in a society (Brandolini and D'Alessio, 2000; Chakravarty and D'Ambrosio, 2003; Atkinson, 2003; Bourguignon and Chakravarty, 2003; Dutta et al., 2003), Deutsch and Silber (2005), Duclos et al. (2006), Bossert, chakravarty and D'Ambrosio (2009)]. Nota No se si hace falta poner esta lista o solo con decir Ayala ya se supone que esta hecho el survey alli)

This development has made available new aggregation methods for the different determining dimensions of individuals' well-being, as well as a set of more robust properties and axioms to construct synthetic multidimensional deprivation indices.
Another important issue when measuring deprivation is the choice between either the interest is focused in whether the individual is deprived or not; or the interest is the intensity of deprivation. The lack of consensus in terms of how to determine the cut-off point leads us not to follow this approach, since possible results are quite sensitive to

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1 Alternative weights can vary inversely to the square root of the share of the population lacking a given item (Boarini and d´Ercole, 2006)

the threshold chosen. We will focus our interest on the intensity of the material deprivations, which is based in a mean index indicating the average number of lacked items, without defining any threshold.

We consider thirteen non-monetary dichotomous indicators; each of them is derived from a household level question in terms of the affordability of a specific item. All the items are listed in Table 1. Following Layte et al. (2001), the selected items are considered to cover a well defined domain of deprivation usually referred as Current Life-Style Deprivation. Nosotros quitabamos algo de financial, no??? comprobar. There are marked differences across countries in the average number of the items lacking each year (with larger values in ? and ?).

-------- Insert Table 1 about here -------

In order to test the reliability of the considered items as good proxies of the underlying deprivation concept, it is common to look at the Cronbach's alpha (esto al final lo hemos hecho?), a correlation index that shows the extent to which a set of questions are all associated with each other[2].

Following the literature on multiple deprivation (e.g. Nolan and Whelan 1996, Atkinson 2003), we combine the non-monetary indicators into a single deprivation index, using a sum score approach. We define I_{ij} the dichotomous indicators

$$I_{ij} = \begin{cases} 0 & \text{affordability} \\ 1 & \text{non affordability} \end{cases} \quad \text{for } j = 1,....,J$$

We also define w_{jt} being the weight corresponding to each indicator j at each point in time t, equal across individuals. Then, D_{it}, the deprivation level for each individual $i=1,…, N$ at each point in time $t=1,…, T$, is defined as

$$D_{it} = \sum_{j=1}^{J} w_{jt} I_{ijt}$$

A number of approaches have been used to determine the weight w_{jt}. We consider one of the most widely applied, the "prevalence weighting". It associates to each indicator a weight corresponding to the percentage of individuals owning the item at each point in time t. The smaller is the proportion of individuals in the population at t with a lack of a given item, the higher the weight assigned to the corresponding

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[2] A threshold commonly used to judge if a dimension is usually identified around 0.70 (Nunnally and Bernstein, 1994). Specific estimates show Cronbach's alphas varying between 0.61 in (Austria) and 0.81 (Portugal), suggesting that the deprivation indicators have internal consistency across time

indicator. It means that the lack of such an item contributes more to the overall deprivation of the individual. As pointed out by Whelan et al. (2002), the prevalence weighting is an appropriate way of assigning more importance to items which can be legitimately seen as more strongly indicative of a status of deprivation: being deprived means not having what other individuals have. Moreover, such a weighting approach allows the deprivation score of a given individual to increase if his/her conditions do not change but all other individuals are better off. Two distinct aspects are taken into account in this weighting approach: the relative lack of each item in the population and their variation over time[3]. In our case, we drop the dynamic considerations. Another advantage of using country specific and time-varying weights, is that this index takes into account the variations in the possession of any item over time and across countries due to economic, social and cultural differences. In order to be comparable across countries, the deprivation index is normalized dividing it by the sum of all weights. The index will range from 0 to 1.

As pointed out in Figari (2010), the deprivation indexes based on the sum score approach perform at least as well as other more complicated methodologies, with the advantage of transparency and conceptual clarity. Moreover such an approach has been widely used in the derivation of the official indicator of deprivation at EU level. Following an increasing consensus in the literature (Whelan et al. 2002), in the analysis we report in Table 2 the estimates based on the prevalence weighted deprivation index as main specification.

-------- Insert Table 2 about here -------

We find that, on average, the intensity of deprivation is 0,??. By country, we also find that deprivation ranges from 0.?? in ?? to 0.?? in ??. Finally, notice that there is a huge concentration of countries …….

Definition of explanatory variables

To test the group of hypothesis that correspond to factors from the individual perspective (micro-level analysis) we choose the following variables. To cover the idea behind the *Income Hypothesis* we include the variable *Income* which represent the ….. The mean income……in 2008….

The *Gender Hypothesis* is covered by the variable *Woman*; coded 1 if the adult

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[3] For a different approach using an annual standardisation of the index see Berthoud and Bryan (2010).

in the household is a woman and 0 otherwise. In 2008….

To include the idea behind the *Age Hypothesis*, we include two variables related to age: *Young*, if below 20 years of age and *Old*, if above 65 years of age. Therefore the age reference group is composed by individuals between 20 and 65 years of age Alternatively, since there is mixed evidence of the influence of factor we can consider the variable *Age* and the variable *Age2* (age squared) to allow for the possibility that the relationship between deprivation and age is a U-shaped or saddle shaped pattern with deprivation initially decreasing with increasing age but increasing again after a certain age threshold.We find that ?? percent of population are young, while ?? are old people.

To capture the effects behind the *Employment Status Hypothesis*, we define the variable *Work*, based on the self-declared main activity status of the head of household. *Work* is coded 1 for those working full time for pay or profit, and 0 otherwise. The distinction between full-time and part-time work should be made on the basis of a spontaneous answer given by the respondent. We also consider the variable *Others_work* that measures whether there are other members of the household working. In 2008, ?? percent of population..

The *Household Structure Hypothesis* is modeled through the variable *Children,* that represents the number of household members aged 13 or less. In 2008, the mean number of dependent children ….. We also include information about marital status, that is, the variable *Marital_Status* is coded 1 if head of household was never married, and 0 otherwise.

For the *Human Capital Hypothesis*, we consider the variable *Tertiary*, coded 1 if the first stage of tertiary education (not leading directly to an advanced research qualification) or second stage of tertiary education (leading to an advanced research qualification) has been attained and 0 otherwise. Recall that in EU-SILC, the educational attainment of a person is the highest level of an educational programme the person has successfully completed and the study field of this programme. The educational classification to be used is the International Standard Classification of Education (ISCED 1997) coded according to the seven ISCED-97 categories. In 2008, ?? percent of population had tertiary education.

For the *Health Hypothesis*, we consider the variable *Health*, coded 1 if ……… and 0 otherwise. Recall that in EU-SILC…..

Finally, to cover the idea of *Home Tenure Hypothesis* we include the variable *Home_Tenure* that measures whether or not they own the household???…….

Similarly, to include the country characteristics, as described before through the structural context hypothesis, as explanatory factors of the gender differences in poverty by country, we consider the following variables.

To cover the *Welfare State Hypothesis,* we use information on expenditure on social protection in the countries analyzed, provided by the statistical office of the European Union (EUROSTAT). The variable *Socialprot*, by country, measures the ratio of the total expenditure on social protection and the gross domestic product. Dewilde (2008 utiliza (a)Country Replacement rate unemployment and (b)Social assistance benefit level. Obtenidas de (a) Source: OECD (2004a). Overall average of net replacement rates over 60 months of unemployment (including social assistance, housing benefits and family benefits; childcare benefits or childcare costs are not considered), for four family types and two earnings levels and (b) Source: MISSOC (European Commission 2001), amounts in PPPs (€) for a couple with 2 children (8 and 12 years), including family benefits. Poner algunos numeros sobre las variables.. In ???,)))) and (((the amount of expenditure on social protection is relatively large compared to the gross domestic product (around 30 percent).

The *Family support hypothesis* will be measured by Child benefit package and (f)% Children in public childcare. They are obtained from (i) Bradshaw and Finch (2002). Absolute amounts in PPPs (£), takes account of taxes and benefits, services and housing costs. Figures for a one-earner family on an average income; and (ii) OECD (2001)

The *Labor Market Hypothesis* is modeled through the variable *Employment_Rate*, which measures the employment rate in the country. Dewilde (2008 utiliza (a) Employment protection legislation index and (b)% Employees on fixedterm contract. Obtenidas de (a)Source: OECD (2004b), regulations concerning regular employment, temporary employment and collective dismissal and (b)Source: EUROSTAT (http://epp.eurostat.ec.europa.eu/) (2002). Poner algunos numeros…The smallest rate corresponds to Romania (1.3 percent) while the highest belongs to Spain (29.3 percent).

Variable *Secte_ed*, which measures the percentage of the population with upper secondary or tertiary education attainment, captures the *Educational Hypothesis*. The smallest…

To test the *Gross Domestic Product Hypothesis*, we include the variable *GDP*, which is expressed in Purchasing Power Standard as a percentage of the EU27 average

and obtained from records of EUROSTAT. *GDP* varies between 40 (Bulgaria) and 275 (Luxembourg).

To cover the idea of *Inequality Hypothesis* we include the variable *Gini* that is the Gini coefficient or the variable *Inequality* that measures the ratio of the 10th quantile to 90th quantile. The highest inequality appears in….

To include the *Population Composition Hypothesis* we include the variable *Elderly* that represents the percentage of elderly. In 2008 the lower….

To test the *Industrial Hypothesis* we incorporate the variable *Industry* that measures the percentage of the industry sector in total gross domestic product. ?? is the country with the highest participation of industrial sector in the economy.
Finally, the *Competitiveness Hypothesis* is represented by variable *Competitiveness*…..

5. The model

As presented in previous sections, our dependent variable will reflect the intensity of material deprivation among European countries. Thus, we will consider a continuous dependent variable. The usual linear estimation methods … or Tobit regression model is typically utilized to estimate that type of variables (si hay muchos ceros).

However, as pointed out by Brady et al. (2009), due to the clustering of individuals within countries and the inclusion of country-level variables, the standard or the tobit regression model violates the assumption of the independence of errors[4]. A natural way to analyze such a hierarchical data structure is to use contextual regression models. Contextual regression models integrate variables at several levels of a hierarchy in one analysis. Kreft and de Leeuw (1998) notice three different approaches in contextual regression modeling: traditional non-hierarchical extensions (e.g. separate regressions by country), classical contextual models (e.g. analysis of covariance) and modern multilevel models (random components). Clearly, in separate regressions no country-level explanatory variables can be included in the analysis. A major drawback of analysis of covariance is that the effects of country-level explanatory variables are confounded with the effects of country dummies. In a multilevel model, these effects can be separated out by specifying country membership as an unobserved random effect.

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[4] Ignoring clustering leads to underestimation of standard errors particularly for predictors measured at group level. There are methods to adjust standard errors for design effects. Another approach is to model dependency between observations in the same group using marginal model. Both methods yield correct standard errors but treat clustering as a nuisance rather than a feature of substantive interest in its own right. Therefore, they are useful to control for clustering if you are not interested in exploring clustering.

Callens and Croux (2009) point that, traditionally, in non-hierarchical models the nested nature of the data has been ignored completely. In classical contextual models and in modern multilevel models, individual and country-level variables can be introduced simultaneously. These methods adequately can split the variation into a between-individual level and a within-country level, but each in their own way. Classical contextual models let the intercept and/or the coefficients vary in a fixed way, while modern multilevel models allow the intercept and/or the coefficients to vary randomly.

We prefer to model the nesting of individuals, i, within countries, c, using random effects. We make random effects to take the form random intercepts, and the grouping structure of the data consists of multiple levels of nested groups (individuals nested into countries). The random effects are summarized according to their estimated variances and covariances. Finally, it is worth mentioning that the random effects model is a "unit specific" rather than "population averaged" approach[5].

We would like to point out that this methodological approach is the proper one to answer the type of proposed goals. The alternative approaches yield also correct standard errors, but treat clustering as a nuisance. Since for us, country differences are of substantive interest, we need a model in which we can explore information behind clustering.

Consider a two level structure where individuals, i, are nested into countries, c. We denote by y_{ic}^* the response for individual i in country c, and x_{ic} is an explanatory variable. A random intercept model can be written as follows: y_{ic}^*

A number of approaches have been used to determine the weight w_{jt}. We consider one

$$y_{ic}^* = \beta_0 + \beta_1 x_{ic} + \xi_{0c} + \varepsilon_{ic} \tag{1}$$

where ξ_{0c} designate the random intercept. The random effects, ξ_0, and the individual level residuals, ε_{ic}, are assumed to be independent and to follow normal distributions with zero mean. The random effects variances are extra parameters to be estimated. If they are significantly different from zero, then we can say that country differences are present.

---

[5] There are reasonable multilevel modelling alternatives. We could estimate a model with robust-clustered errors. The standard errors would be properly adjusted but we would be unable to asses the degree of between group variation. We could also have estimated a GEE (generalised estimating equation) model but in this type of model no information about higher level variation is provided and it is only useful for making inferences about average population effects. We propose random effects model is defensible with comparable strength to these alternatives as we explicitly specify a hierarchical structure, obtain correct standard errors and an estimate of the between group variance.

In order to test our hypothesis we propose four models. We define *Deprivation* as a continuous variable, which takes value from 0 to 1 and measures the intensity of individual's material deprivation.

We use different versions of (1). In order to analyze whether the gender differences in poverty among countries can be explained by compositional differences (individual perspective) of their population we propose Model A, which incorporates individual-level explanatory variables.

$$y_{ic}^* = \beta_0 + \beta_1 \times Income_{ic} + \beta_2 \times Woman_{ic} + \beta_3 \times Young_{ic} + \beta_4 \times Old_{ic} + + \beta_5 \times Work_{ic} +$$
$$\beta_6 \times Children_{ic} + \beta_7 \times Marital\_Status_{ic} + \beta_8 \times Tertiary_{ic} + \beta_9 \times Health_{ic} +$$
$$\beta_{10} \times Home\_Tenure_{ic} + \xi_{0c} + \varepsilon_{ic} \tag{B}$$

We also propose Model B, which incorporates one by one the country-level explanatory variables.

$$y_{ic}^* = \beta_0 + \beta_{11} \times Employment\_Rate + \beta_{12} \times Secter\_ed_{ic} + \beta_{13} \times Socialprot_{ic} + \beta_{14} \times GDP_{ic} +$$
$$\beta_{15} \times Inequality_{ic} + \beta_{16} \times Elderly_{ic} + \beta_{17} \times Industry_{ic} + \beta_{18} \times Competitiveness_{ic} + \xi_0 + \varepsilon_{ic}$$
$$\text{(C)}$$

If the country-level intercept variance (ξ_0) is not statistically significantly different from zero, then it is said that the country-level variables capture the country variation and there is not significant country heterogeneity left.

To test whether context effects have an effect on the differences among countries with respect to poverty gap after controlling for salient individual predictors of poverty, we propose Model C, which extents Model A incorporating the country level variables.

6. The empirical results

We present the estimation results for the intensity of material deprivation Table 3. We show the estimates for the β_i coefficients, for the intercept standard deviation, σ_{ξ_0}.

estimation procedure. A general finding for all the models proposed, not only for the risk of being poor but also for the risk of exiting and entering poverty, is that the random intercept standard deviation (σ_{ξ_0}) is statistically different from zero. It means that, even after introducing country level explicative variables, there is still a significant part of the unexplained variance due to the country differences. This unexplained variance is indeed, picked up by the random intercept.

--------------- Insert Table 3 about here ------------

Concerning our first aim, that is, to test if the composition of population (micro-level variables) affects those country differences in the intensity of material deprivation, we find the following results. Those individuals with ….

To sum up, we find evidence in favor of the …… hypotheses….

However, to give an answer to this aim, needs additional analysis. First, we test the relevance of including the random slope in the model. We compare the fit of model A for the risk of being poor, with the fit of a version of model A excluding the random slope. We carry out a likelihood ratio test to assess the null hypothesis of no country variation in the intensity of deprivation. We find that there exists strong evidence that gender effect differs across countries once we control by individual effects.

Concerning our second general hypothesis, that is, country characteristics influence those country differences in the gender effect on the risk of being poor, of entering and exiting poverty, we describe our results. Nosotros vamos a ir variable a variable, no??? our estimation results confirm …….

To sum up, we find evidence in favor of the …… hypotheses….

As before, to answer the second goal, some extra analysis is in order. We compare the fit of model B with a version of model B excluding the random slope. We carry out a likelihood ratio test to test the null hypothesis of no country variation in the intensity of deprivation once we control by country variables. We conclude that there exists strong evidence that gender effect differs across countries once we control by context effects. The same results are obtained in the model for exits from poverty and in the model of entries into poverty.

Given that both individual and country specific variables affect the country differences in gender effect in terms of poverty, we compare the contribution of both types of variables. Individual or micro effects unmask country differences in the gender gap, while macro or context effects explain some of the differences among countries in the intensity of

material deprivation. Country level variables explain ??? percent of the differences, while ?? percent of this variance is unmasked when introducing individual level variables. Consequently, we conclude that country context explains more of the differences among countries…..

7. Conclusions

References

Atkinson, A.B. (2003). "Multidimensional deprivation: contrasting social welfare and counting approaches", Journal of Economic Inequality, 1, 51-65.

Atkinson, A.B, Cantillon, B., Marlier, E. and Nolan, B. (2002) Social Indicators: The EU and Social Inclusion, Oxford University Press, Oxford.

Ayala, L., Jurado, A. and Pérez-Mayo, J. (2010). Income poverty and multidimensional deprivation: lessons from cross-regional analysis. *Review of Income and Wealth*, forthcoming, no. doi: 10.1111/j.1475-4991.2010.00393.x

Berthoud, R. and Bryan, M. (2011) Income, Deprivation and Poverty: A Longitudinal Analysis. *Journal of Social Policy*. 40(1), pp. 135-156

Bossert W., Chakravarty, S. R. and D'Ambrosio C. (2009), "Multidimensional poverty and material deprivation," Working Papers 129, ECINEQ, *Society for the Study of Economic Inequality*.

Boarini, R. and M. Mira d'Ercole (2006), "Measures of Material Deprivation in OECD Countries", *OECD Social, Employment and Migration Working Papers*, No. 37, OECD Publishing.

Bourguignon, F. and Chakravarty, S.R. (2003): "The measurement of multidimensional poverty", *Journal of Economic Inequality*, 1, 25-49.

Brady, D., Fullerton, A. S., and J. Moren Cross (2009). Putting Poverty in Political Context: A Multi-Level Analysis of Adult Poverty across 18 Affluent Democracies. *Social Forces*, 88(1), pp.271-300

Brandolini A. (2008), "On applying synthetic indices of multidimensional well-being: Health and Income inequalities in selected EU countries", Banca d'Italia, Temi di discussione 668.

Bray J. R. (2001), .Hardship in Australia., Department of Family and Community Services, Occasional Paper No.°4.

Callens, M. and C. Croux (2009). Poverty Dynamics in Europe: A Multilevel Recurrent Discrete-Time Hazard. *International Sociology*, 24; pp. 368-396.

Dewilde 2006

Dewilde, C. 2008 'Individual and Institutional Determinants of Multidimensional Poverty: A European Comparison', *Social Indicators Research*, 86(2): 233-256.

Engeland, J. and R. Lewis (2004), "Exclusion from Acceptable Housing. Canadians in Core Housing Need", *Policy Research Initiative*, 7, 2.

Eurostat (2002). *European social Statistics. Income, poverty and social exclusion: 2nd report*. European Commission, Luxembourg.

Feijten, P., and Mulder, C. H. (2005). Life-course experience and housing quality. Housing Studies, 20, 571–587.Figari, F. (2010), Cross-national differences in determinants of multiple deprivation in Europe. Journal of Economic Inequality, Forthcoming

Figari F, 2009. "Cross-National Differences in Determinants of Multiple Deprivation in Europe," ISER working papers 2009-34, Institute for Social and Economic Research.

Goldthorpe, J. (2000). *On Sociology*. Oxford University Press.

Guio, A.-C. (2005), *Material Deprivation in the EU*, Statistics in Focus, Population and Social Conditions, Living Conditions and Welfare, 21/2005, Eurostat, Luxembourg.

Guio, A.-C. (2009), What can be learned from deprivation indicators in Europe, Methodologies and Working Papers, 2009 ediciton. Eurostat, Luxembourg.

Halleröd, B, Larsson, D. Gordon, D. and Ritakallio, V. (2006) Relative deprivation: a comparative analysis of Britain, Finland and Sweden. *Journal of European Social Policy* 2006; 16; 328

Jenkins, S. P. (2000) Modelling household income dynamics. *Journal of Population Economics* 13: 529-67.

Kreft, I. G. G. and J. de Leeuw, (1998) Introducing Multilevel Modeling. Thousands Oaks, CA: Sage.

Layte, R., C. Whelan, B. Maître and B. Nolan: 2001, 'Explaining levels of deprivation in the European Union', *Acta Sociologica* 44, pp. 105–122.

Lollivier, S. and D. Verger (1997), .Pauvreté d.existence, monétaire ou subjective sont distinctes, Economie et Statistique, pp. 308-310.

Mack, J. and Lansley, S. (1985): *Poor Britain*. London: Allen and Urwin.

Mayer, S.E. and Jencks, C. (1989): "Poverty and the distribution of material resources" *Journal of Human Resources*, 24, 88-113.

Muffels, R. and Fouarge, D. (2004): The role of European Welfare States in explaining resources deprivation. *Social Indicators Research* 68: 299–330.

Muffels and Fouarge (2003)

Nolan, B. and Whelan, C.T. (1996): *Resources, deprivation and poverty*, Clarendon Press, Oxford.

Nolan, B. and Whelan, C.T. (2007) "Multidimensionality of poverty and social exclusion", in Jenkins, S.P. and Micklewright, J. *Resources, Deprivation and Poverty*, Oxford, Clarendon Press.

Perry, B. (2002), .The mismatch between income measures and direct outcome measures of poverty. *Social Policy Journal of New Zealand*, 19, pp. 101-127.

Saunders, P., and Adelman, L. (2005). Resources, deprivation and exclusion approaches to measuring well-being: A comparative study of Australia and Britain. The Social Policy Research Centre, 141

Townsend, P. (1979): *Poverty in the United Kingdom*. Harmondsworth: Penguin Books.

Tsaklogou, P. and Papadopoulos, F. (2002). Poverty, material deprivation and multidimensional disadvantage during four life stages: Evidence from ECHP, in M. Bargnes, C. Heady, S. Middleton, J. Millar, F. Papadopoulos, G. Room and P. Tsaklogou (eds): *Poverty and Social Exclusion in Europe*, Edward Elgar Publising Limited.

Whelan et al. (2002)

Whelan, C.T., Layte, R., Maître, B. and Nolan, L. (2001): "Income, Deprivation, and Economic Strain. An Analysis of the European Community Household Panel", *European Sociological Review*, 17, 357-372.

Whelan, C.T., Layte, R. and Maître, B. (2004). Understanding the Mismatch between Income Poverty and Deprivation: A Dynamic Comparative Analysis. *European Sociological Review,* 20 (4), 287-302

Whelan, C.T., Nolan, L. and Maître, B. (2008) Measuring Material Deprivation in the Enlarged EU, *Economic and Social Research Institute (ESRI) Papers* WP249.

Zaidi, A. and Burchardt, T. (2005), 'Comparing incomes when needs differ: equivalisation for the extra costs of disability in the UK', *Review of Income and Wealth*, 51: 1, 89–114.

Appendix

Table 1: ECHP questions used to derive the Deprivation Index

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**
… possession of a **car or van (for private use)**
… possession of **colour tv**
… possession of **video recorder**
… possession of **micro wave**
… possession of **dishwasher**
… possession of **telephone**

Notes: The first seven questions are based on a common phrase: "There are some things many people cannot afford even if they would like them. Can I just check whether your household can afford these, if you want them?". The remaining six questions are posed in two steps: in the first step the household respondent is asked to indicate whether or not the household possesses the item. If not a follow up question asks whether this is because of non affordability.

Table 2: Average Deprivation Index (Prevalence Weighting) and Country Ranking

Country	Mean	Rank
Austria		
Belgium		
Denmark		
Finland		
France.		

Notes:

Table 3: Estimation results for the intensity of material deprivation

	Model A				Model B				
Income	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Woman	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Young	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Old	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Children	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Work	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Others_work	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Marital_Status	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Tertiary	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Health	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Home_Tenure	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Socialprot		0.000***							(
		[0.000]							
Employment_Rate			0.000***						(
			[0.000]						
Sectert_Ed				0.000***					(
				[0.000]					
Gdp					0.000***				(
					[0.000]				
Inequality						0.000***			(
						[0.000]			
Industry							0.000***		(
							[0.000]		
Competitiveness								0.000***	(
								[0.000]	
Constant	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
σ_{ξ_0}	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	(
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Number Of Groups									
Log Lokelihood									

*** p<0.01, ** p<0.05, * p<0.1