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Micro and Macro Drivers of Material Deprivation Rates

Research note no. 7/2015

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Abstract

This Research Note examines, first, macro drivers of material deprivation, essentially analysing the factors which seem to explain differences across countries in the proportion of the population that are identified as being materially deprived, secondly, micro drivers, or, more accurately, the effect of changes in household income on the situation of people in this regard. Both parts use the indicator of material deprivation developed for assessing and monitoring the extent of deprivation in the EU in the different Member States, which is based on the inability of households to afford a given number among nine items included in the EU-SILC. The first is based on the core EU_SILC dataset and focuses on the indicator of severe material deprivation, which is measured as the inability of households to afford any four of the nine items in question. The second is based on the longitudinal data included in the EU-SILC, which enables the situation of the same household to be tracked over time, in this case over three years, 2010-2012, and is focused on the standard indicator of deprivation, which is the inability to afford any three of the nine items.

Introduction

The Research Note is divided into two parts. The first part examines the determinants of severe material deprivation rate (SMD rate), or more precisely the relationship between the proportion of the population in EU Member States living in households which are assessed as being severely materially deprived and the level of income and its distribution, the rate of employment, access to public services and other potential influences in the countries concerned. This is carried out by means of a multivariate regression analysis of panel data for EU Member States covering the period 2005-2012, the central aim being to identify the main factors responsible for differences in severe material deprivation rates across the EU.

The second part adopts a micro-level approach, using longitudinal data from the EU-SILC to examine changes in the incidence of material deprivation among households and in the components of the indicator developed to measure this. Following on from the first part of the Note, which finds that disposable income is a major determinate of deprivation, it focuses on the extent to which changes in household income are followed by changes in being materially deprived or not, in particular on how far a reduction in income is accompanied by the household becoming material deprived.

Part 1 Macro drivers of material deprivation

Introduction

Under the Europe 2020 strategy, a target has been set to reduce those at-risk of poverty or social exclusion[1] in the EU, defining these to be people either with income below 60% of the national median (the usual definition of being at risk of poverty), or being severely materially deprived or living in a household with low work intensity. These elements of the poverty target represent different aspects of economic vulnerability and the combined use of the poverty indicators has raised the need for more research on the theoretical and empirical aspects of these measures and their inter-relationship.

Previous research has, in general, concentrated on the construction of the material deprivation indicators (see for example Nolan-Whelan (2007), Hick (2012a), Crettaz-Sutter (2013) or McKnight (2013)), or on the relationship between material deprivation and selected other variables such as the at-risk-of-poverty (AROP) rate or disposable income. The objective of the present study is to add a wider set of macro drivers to the analysis using both aggregated micro-level data from the EU-SILC database and macro-level data from the Eurostat database. The variable of interest of the study is the aggregated material deprivation rate on a country-level. The analysis is performed on a panel dataset consisting of the EU27 countries between 2005 and 2012.

The material deprivation indicator has special advantageous characteristics for cross-country comparison. Contrary to at-risk-of-poverty rates and other relative poverty indicators, material deprivation rates were created also to reflect absolute aspects of poverty. Therefore, applying this measure to cross-country comparisons can add to the understanding of international differences in rates of poverty and social exclusion. As material deprivation differentiates between affordable and non-affordable goods for households, it is expected to closely correlate with macro indicators that somehow mirror the wealth and development of a country. However, we do not know how close this correlation is. Is it only the wealth of the country that is mirrored in material deprivation rates, or are there other institutional and policy factors that play a role in the determination of deprivation? This question is investigated here using econometric techniques to analyse a set of relevant indicators.

[1] In this research note, we use the following terminology: 1. At-risk: population at risk of poverty and social exclusion according to the EU definition, 2. At-risk-of-poverty: income-poor population (defined as having an income that is lower than 60% of the median income of the country).

First, the interest is in the relationship between material deprivation rates and average disposable income at country-level. Based on the arguments above, a close negative relationship is expected between the two variables, with higher income, as a proxy for a more developed and wealthier country, being associated with lower deprivation rates.

It is also expected that besides the level of average disposable income in the country, its distribution will play a role too in determining overall material deprivation rates. A measure to reflect income inequality is therefore also included in the explanation, specifically the poverty gap[2]. This measure captures the mean aggregate income or consumption lack relative to the poverty line across the whole population by summing the shortfalls relative to the poverty line and dividing this by the total population. This measure reflects the dispersion focusing on the distance between the middle and the bottom of the distribution. A less equal distribution of income is likely to imply higher deprivation rates. Second-order effects are also examined by including the interaction between disposable income and income distribution in the analysis.

Even if two households have the same disposable income, they may have very different needs. For characteristics related to household economies of scale, this is intended to be corrected by equivalising household income for differences in size and composition. However, this does not account for differences in needs related to, for example, disability or long-term illness. In addition, differences in terms of the provision of public services or social policies may also affect how much a household's income is worth. Free access to education or healthcare services reduces the costs a household has to incur compared with households which have to pay for these services (and so leaving more income for other expenditure in countries with a comprehensive public service system). Variables reflecting the extent of public services as well as the size of social transfers are, therefore, also included in the explanation, with the expectation that wider access to public services and higher social transfers are associated with lower deprivation, holding all other factors constant.

Given that the distribution of households differing in terms of size and composition may also affect overall material deprivation rates (stemming from the fact that, at the micro level, household needs depend on household structure), indicators of the structure of the population are included as well in the analysis – specifically the relative number of young people and of large households. Indicators of the extent to which people are at work (employment rate), their education level (the share of people with only basic schooling, i.e. with lower secondary education or below), and their living patterns (the share of households living in urbanised or intermediate urban settlements) are included too. Underlying hypotheses how these factors are related to material deprivation are explained below.

An additional focus of this research note is to test the relationship of the material deprivation indicator with variables that are potentially culture-specific. The hypothesis is that there are some subjective factors varying between countries that may affect the interpretation of certain items of the material deprivation rate, which are common to all countries. These disparities might put into question the absolute nature and the cross-country comparability of the material deprivation indicator. For example, attitudes towards car ownership, tourism or savings might differ greatly across countries. The relationship between these potentially culture-specific variables and individual items of the deprivation indicator is, therefore, also examined along with the question of whether these cultural differences have any effect on the aggregate deprivation indicator.

The structure of this part of the Research Note is as follows. The next section describes theoretical and empirical aspects of material deprivation research. Section 3 introduces the data and methods used in the subsequent analysis. Section 4 sets out the empirical results, first examining simple correlations and then specifying fixed effect regression models in order to explore variations in material deprivation rates and considering the relationship

[2] In earlier phases of the analysis, the P90/P10 ratio was used, but the poverty gap seems to be a better predictor of material deprivation rates.

between various items of the material deprivation indicator and the explanatory variables listed above. Section 5 presents some conclusions.

The concept of material deprivation

The analysis here is concerned with determinants of material deprivation rates. The definition of the term material deprivation has changed since it first appeared in the literature (Townsend, 1979), although the idea behind it has remained relatively stable over time. This section reviews definitions of the term and the theoretical background, and highlights some measurement issues that arise.

Material deprivation is a measure of poverty and social exclusion, which was first used by Townsend (1979), who defined it as the "inability of living a decent life". Today, several definitions exist, for example "exclusion from the minimum acceptable way of life in one's own society because of inadequate resources" or "lack of socially perceived necessities" (Boarini-D'Ercole, 2006).

It is also a measure of the satisfaction of needs according to Fusco, Guio and Marlier (2010). Sen (1999) emphasizes that the material deprivation status of the household indicates the adequacy of income. Nolan and Whelan (2011a) claim that material deprivation shows the economic stress households face, and in this sense it is a similar indicator to the 'inability to make ends meet' measure.

Usually, poverty is measured by a threshold and an index, which show the incidence and/or the severity. Poverty indicators can be defined in terms of several dimensions:

- monetary or non-monetary
- input- or outcome-based
- absolute or relative measures (Boarini-D'Ercole, 2006).

The material deprivation indicator

In the EU, material deprivation has been defined as a composite indicator based on 9 individual items, which assess the financial stress a household faces and the durables they can afford. A household is considered materially deprived if it is in any three of the following situations:

1. lacks the capacity to face unexpected expenses,
2. lacks the capacity to have a one-week holiday away from home,
3. lacks the capacity to afford a meal with meat, chicken and fish every second day,
4. lacks the ability to keep the house adequately warm,
5. has arrears on mortgage, rent, utility bills, hire purchase instalments or loans,
6. does not have a washing machine because it cannot afford one,
7. does not have a color TV because it cannot afford one,
8. does not have a telephone, because it cannot afford one,
9. does not have a car, because it cannot afford one.

Those households where at least four of the above apply are considered *severely deprived*. This concept is also used in this study. For conceptual and methodological details see Guio (2009) and Fusco, Guio and Marlier (2010).

Material deprivation is an absolute, non-monetary, outcome-based measure of material well-being. It focuses on the outcome (quality of life of the household), not on the resources (monetary or non-monetary means to reach it). Household needs can differ greatly across space, time and social class (Fusco, Guio and Marlier, 2010). Differences in financial resources, access to public services, the cost of living or other household characteristics affect to a large extent how much income the household needs for a certain standard of living. Material deprivation rates also have the advantage of being comparable across countries as compared with at-risk-of-poverty rates, which are only partly able to capture variations in average income between countries and over time (Hick, 2014). This advantage is especially important in the EU context, where comparing populations at-risk in countries with very different disposable income and institutional systems is both politically sensitive and scientifically challenging.

The 'enforced lack' approach means that households are only considered deprived of an item if they do not have it because they cannot afford to have it (i.e. those who choose not to have a car or holidays are not considered to be deprived of this item). Lacking three

items is an absolute threshold for being identified as materially deprived. Lacking four items is the threshold for severe material deprivation (SMD). Despite this seemingly simple approach, using material deprivation as an indicator of poverty, gives rise to a significant measurement problem. Answers about the same items may involve some subjectivity, given cross-country and cross-household differences in tastes, aspirations, definitions of 'capabilities', etc. McKnight (2013) for example found evidence that some households in lower income households tend to under-report items as necessities. This way, they seem to adapt to their material situation by adjusting their view about their needs. However, if households in a worsening material situation consider fewer items necessities than households in an improving situation, then material deprivation rates may underestimate the number of people who are deprived in the population.

Crettaz and Sutter (2013) found that material deprivation can be affected by adaptive preferences. This means that poor families may adapt their preferences to the situation, and, accordingly, spending longer period in poverty has a stronger effect on preferences. However, Crettaz (2012) suggests that these under-estimates cannot be very significant if deprivation rates are compared over short intervals of time. At the same time, he emphasises the need for caution when comparing poverty rates over long time periods between different countries because of preferences adapting.

The material deprivation indicator is being constantly assessed. Recently, Guio, Gordon and Marlier (2012) used a specific module of the EU-SILC 2009 (that was designed to check the adequacy and validity of the standard indicator) to propose an alternative indicator. The measure proposed by them is a composite indicator of 13 items, 8 household-level and 5 individual-level items (see Appendix for details).

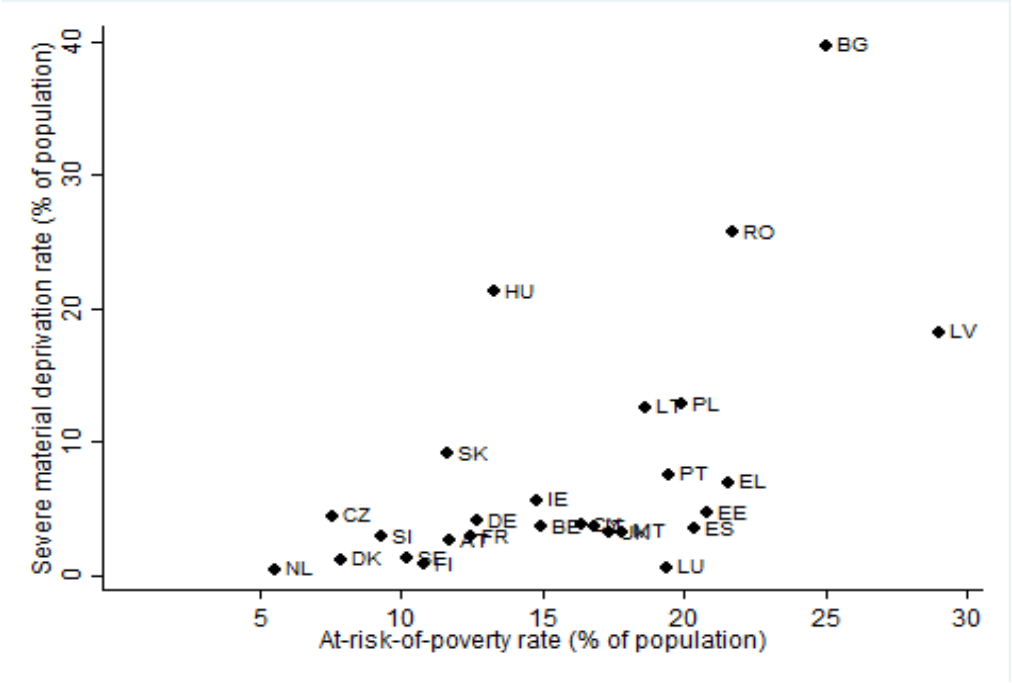
Material deprivation research in the EU

The European Union adopted a poverty and social exclusion reduction target in the Europe 2020 strategy. The target is a multidimensional one, meaning that households that meet any of the criteria of being at risk of poverty (income-poor compared to 60% of the national median income), being severely materially deprived (SMD, lacking at least 4 items from the MD items), or living in a quasi-jobless household are considered to be at-risk of poverty or social exclusion.

The combined use of at-risk indicators raises several questions. What do these indicators exactly measure? What is the relationship between them? What other variables are they correlated with?

There has already been much research undertaken on the at-risk-of-poverty (AROP) rate measure (see for example Cantillon, Van Mechelen, et al. (2014), or Decancq, Goedemé, et al. (2013)), however, less research has been carried out on material deprivation rates. Empirical literature suggests that material deprivation rates often measure very different risks than at-risk-of-poverty rates. Material deprivation rates seem to vary across countries much more than AROP rates do and they do not correlate closely with AROP rates (see Figure 1, which relates to 2009, as an example. As noted above, the focus here is on the kinds of factor that may drive cross-country differences in severe material deprivation rates.

Figure 1. Severe material deprivation rate and at-risk-of-poverty rate in 2009



Source: Eurostat, EU-SILC, 2009 and authors' calculations

Research on the drivers of MD rates has focused mostly on the relationship with GDP and it is generally concluded that the statistical association between them is in most cases relatively close. However, it is unclear whether this association is merely a correlation, or a causal link between GDP and MD rates.

Previous studies have found that countries with lower GDP tend to have higher material deprivation rates. Matkovic et al. (2007) found that material deprivation rates were higher in EU12 countries (i.e. countries that joined the EU in 2004 and 2007) than EU15 ones. This is in line with findings on other objective poverty measures, which differ from those for relative measures. At the same time, this does not prove that it is differences in the development level of countries that cause the differences in material deprivation rates. It is possible that some characteristics (for example low disposable income) which correlate with higher MD rates are simply more prevalent in lower income countries.

Bárcena-Martín et al. (2011) compared the effects of country-level and individual-level characteristics in determining material deprivation using a multi-level analysis. They found that it is more the country-level characteristics that have a significant and large effect.

This is also very much in line with the findings of Whelan and Maitre (2012), who found that even after including individual effects in regression estimations that try to explain material deprivation, the 'welfare regime' variable has high explanatory power. It is important to note that while Bárcena-Martín et al. (2011) looked at effects of country characteristics, Whelan and Maitre concentrated on the effects of institutions as indicated by country groups.

The relationship between material deprivation rates and GDP or disposable income can provide an answer to the question whether it is mostly the development of the country that matters for material deprivation rates. However, it is also of interest to examine whether at a similar level of average disposable income, institutional features of a country's social system have a significant additional effect on material deprivation rates. Nelson (2012) investigated the relationship between material deprivation rates and social policy institutions in European countries and found that - controlling for many other potential explanatory variables - higher social benefits, especially social assistance benefits, imply a lower material deprivation rate (Nelson, 2012).

Macro drivers of severe material deprivation rates in the EU countries: variables and hypotheses

The main question examined here is how macro variables are associated with severe material deprivation rates. Four different groups of macro variables are included in the analysis; those relating to economic development, institutions, population structure and cultural differences. This section explains the choice of indicators included in the estimations and how they are potentially related to material deprivation rates.

Severe material deprivation rates show a very wide dispersion across countries in Europe. European countries also differ markedly from one another in terms of average disposable income in the country. At first sight and also according to previous literature, these two phenomena seem to be interrelated, as material deprivation rates correlate closely with disposable income across countries. As an illustration, Figures 2 and 3 show the relationship between disposable income and severe material deprivation rates in two years, one at the beginning (2007) and one at the end (2012) of the observed period. There is a clear negative association in both years, shown by the fitted lines. Examining the items which make up the material deprivation indicator immediately suggests an intuitive reason for this. Four of the nine items are durable goods. More developed countries usually have a larger share of population able to afford durable goods. Hence, in more developed countries it is expected that there are less people who are materially deprived. Similarly, it is safe to assume that in a richer country, people are more able to afford a holiday or to pay their bills on time. Accordingly, it is only to be expected that SMD rates would be significantly and negatively correlated with average disposable income. In fact, the concept of material deprivation is strongly related to the adequacy of income and this is further supported by the 'enforced lack' approach.

At the same time, countries with similar disposable income levels do not necessarily have similar SMD rates (see for example Bulgaria and Romania in Figure 1). This implies that there may be other important macro drivers to be considered. A different distribution associated with the same average disposable income may give rise to significant differences in the financial situation of households. To capture this, a measure of inequality, the poverty gap, can be included in the analysis. This measure captures the mean aggregate lack of income or consumption to the poverty line across the whole population (as described above). The measure reflects the dispersion focusing on the distance between the middle and the bottom of the distribution. The expectation is that inequality measured in this way is positively correlated with SMD rates: the greater the inequality, the smaller the share of income going to those at the bottom end and the larger the share of materially deprived households. It may also happen that the effect of the distribution of income is different at different income levels. To capture this difference, the interaction of disposable income and the poverty gap is also included in the analysis.

Although income and inequality are important factors, institutional and policy differences may lead to further disparities in SMD rates. Accordingly, indicators of social policy are also included in the analysis. Free access to public services such as education[3] and healthcare significantly affects the standard of living associated with a given level of disposable income, because households do not have to spend on these services. Similarly, the public pension system may alleviate deprivation for the elderly, so that greater public pension provision in general tends to reduce material deprivation rates[4]. Moreover, social policies targeted at the bottom of the income distribution through unemployment benefits and other social transfers may also have the effect of reducing material deprivation rates. A larger share of GDP spent on public education, healthcare, pensions and social transfers can generally be expected to be associated with a lower material deprivation rate in a

[3] It may be argued that it is especially the amount spent on non-tertiary education that has the effect of reducing SMD rates. The analysis has also been carried out with spending on non-tertiary education as an explanatory variable, however, this variable was not significant in the regression analysis either.

[4] There are other variables usually used to capture access to pensions in a country. As an alternative, the analysis has been carried out with replacement rates as well as coverage rate as a measure of the pension system. However, none of them was significant in the regression analysis.

country. It is important to note that share of GDP spent on these public services may not be the best explanatory variable in some countries, if differences in out-of-pocket payment for health care and education are not well mirrored by government expenditure. In this case, it is possible that a lack of significance is a result of the lack of good indicators, not a lack of a close relationship.

Figure 2. Severe material deprivation rate and average disposable income in 2007

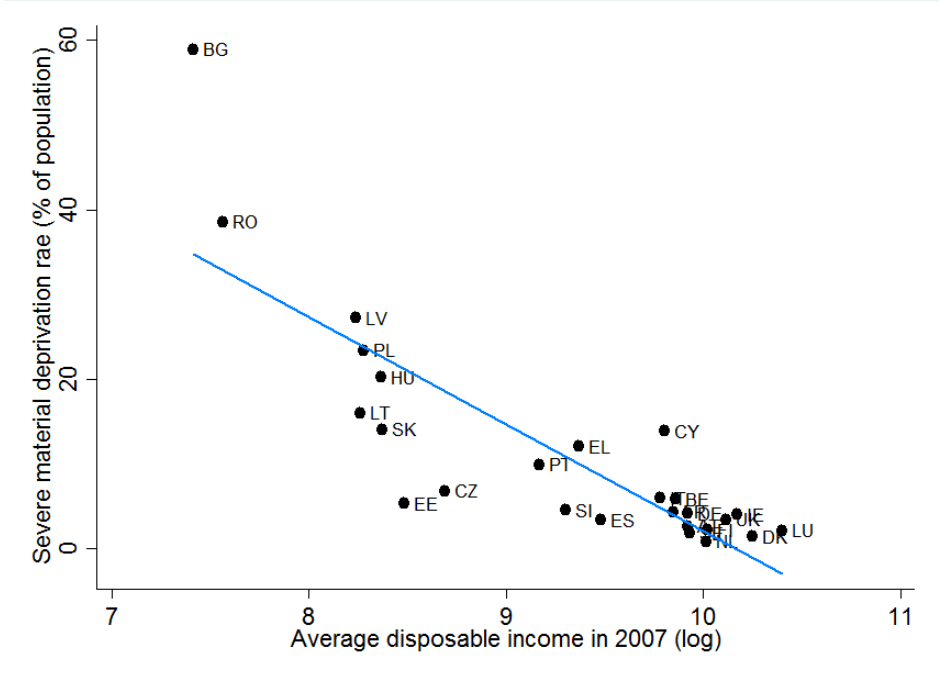
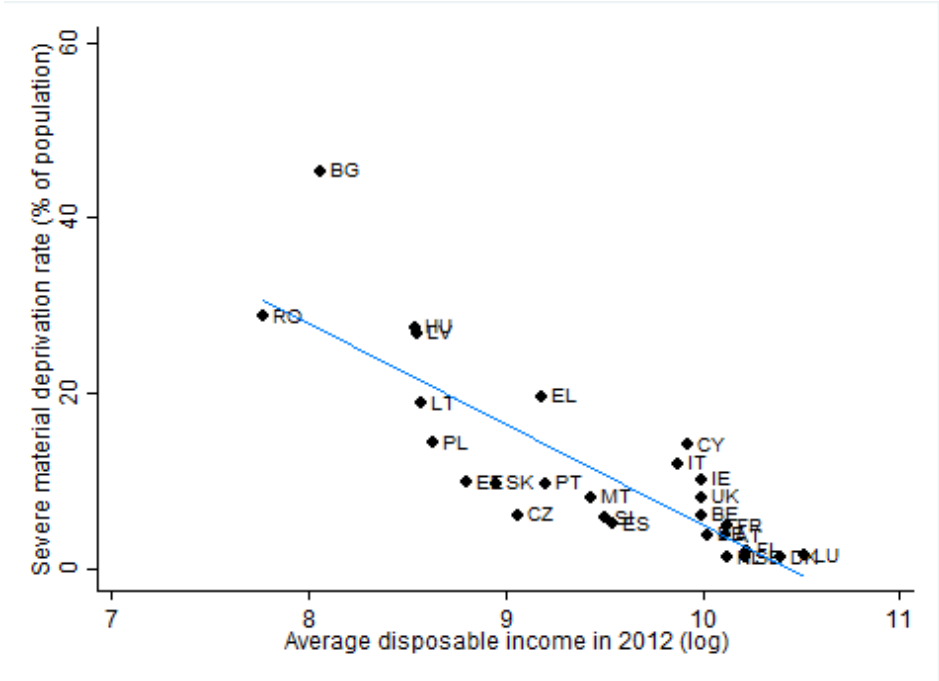


Figure 3. Severe material deprivation rates and average disposable income in 2012



Source: Eurostat, EU-SILC, 2007-2012 and authors' calculations

In addition, there is also a need to take into account the effects of the composition and structure of the population on SMD rates. Previous research has shown that education and

employment are important defences against deprivation, a better educated population with more people working is expected to be less deprived (Boarini-d'Ercole, 2006). Accordingly, the share of low educated (those with lower secondary education or below) as well as the employment rate is included in the analysis. It is also important to see whether controlling for education and employment changes the effect of social benefits.

The share of young people in the population and the relative number of large households are included, though it is less clear how these affect material deprivation rates. On the one hand, higher share of young people implies fewer dependent individuals in the country, hence arguably lower SMD rates. On the other hand, if many of the young people do not work, it may imply a higher SMD rate on the short run. In the case of large households, these might reduce the risk of being deprived for the elderly, though increase it for families with large numbers of children. In the two cases, there is therefore no clear expectation of the sign of the effect so it is of interest to examine the results of the analysis.

It is also of interest to know whether a predominantly rural or urban environment makes a difference to material deprivation rates. The expectation is that a rural environment, with lower population density, might make it less easy for people to access basic services and so might imply a higher expenditure in this regard, suggesting a higher material deprivation rate. To capture this effect, the share of population living in rural households is included.

An additional focus is to explore the subjective nature of material deprivation rates. Previous research has shown that the aggregate material deprivation indicator does not seem to suffer from distortions through differing and potentially subjective interpretations of the items across countries (see for example Guio (2009)). At the same time, it might still be useful to examine the relationship between items in the material deprivation indicator and variables that are potentially correlated with these. For example, there may be cultural differences in attitudes towards specific items that may or may not be mirrored in material deprivation differences across countries or country groups. Three variables of a potentially subjective nature are examined: the savings rate, the per capita stock of cars and per capita participation in tourism.

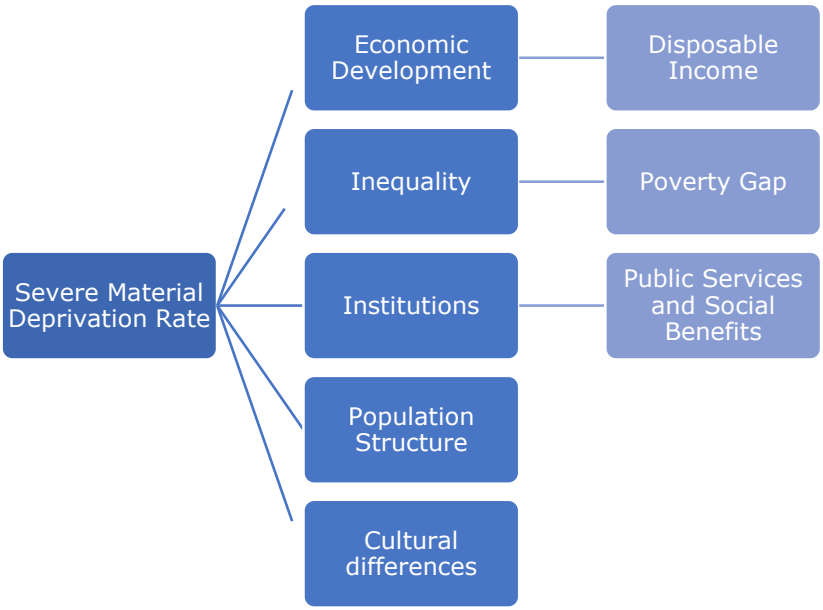
It is to be expected that a higher savings rate is associated with a lower SMD rate as households become more able to cover unexpected expenses, though a higher savings rate may also reflect a more precautionary attitude among households to want to keep larger reserves for unexpected events. To allow for this, an interrelationship between income levels and savings rates is included in the analysis.

A larger stock of cars per capita implies that it is more common to use cars than other forms of transport. For any given level of disposable income, a more car-oriented transport system may tend to be associated with lower material deprivation rates through increased car ownership. Although both a larger stock of cars and higher income imply a lower material deprivation rate, it is possible that in a higher-income country, a car is considered more of a necessity than in lower-income countries.

Similarly, higher participation in tourism may be a sign that going on holiday is considered an important element of an acceptable quality of life. Accordingly, being able to afford a one-week holiday may be more important for people in such countries. To allow for secondary effects of this kind, an interrelationship between the level of income and the two variables concerned is also included in the analysis.

Overall, five groups of variables are included in the analysis: those related to economic development, inequality, institutions – as reflected in social policy – the structure of population and cultural differences. These are summarised in Figure 4. The following section describes the data and methods used.

Figure 4. Potential Drivers of Severe Material Deprivation Rates



Data and methods

Two data sources are combined to examine the determinants of SMD rates[5]. The EU-SILC is the basic one, where macro level variables are calculated from the micro ones. For variables for which the EU-SILC does not provide enough information, the Eurostat database is used. Table 1 describes the variables included in the analysis. The data cover 27 EU Member States (i.e. excluding Croatia) over the 8 years 2005-2012. Unfortunately, the data are not all complete for all countries and years. Nevertheless, the dataset can be considered as a balanced panel one.

The Eurostat data relate to public services, social benefits and the cultural factors.

The EU-SILC dataset covers all EU27 countries for the years 2005-2012, except Bulgaria in 2005 and Romania in 2005-2006. The annual EU-SILC data for households is aggregated to the country level to create macro variables from the micro dataset for severe material deprivation rates, average disposable income, average social transfers and the share of specific groups in the population.

There is a need for caution when mixing macro and aggregated micro variables in the same regression analysis, especially when they originate from different datasets. In this case, standard errors can exceed those shown in the results. To take account of this, higher significance levels are applied for the equations to be accepted.

A two-step analysis is carried out, first, focusing on the correlations between SMD rate and the potential determinants, second, on fixed-effect panel regressions with different groups of the explanatory variables.

The correlation analysis examines the relationship of SMD with other indicators, including over time. The correlations between the explanatory variables are also tested since including highly correlated variables together in a regression equation can produce misleading results.

[5] In the empirical part of this paper, we will only use severe material deprivation rates in all models. Referring to material deprivation rates should be interpreted as referring to severe material deprivation rates.

Table 1. Variables

Variable	Description	Source
Severe material deprivation rate	Share of individuals living in severely materially deprived households in the country (lacking at least 4 items from the 9 item list, see p. 6.)	EU-SILC
(Log) Disposable income	Average of the equivalised[6] disposable income of households, logarithmic	EU-SILC
Relative At-Risk-of-Poverty Gap	Difference between the median equivalised disposable income of people below the at-risk-of-poverty threshold and the at-risk-of-poverty threshold, expressed as a percentage of the at-risk-of-poverty threshold (60 % of national median equivalised disposable income)	Eurostat
(Log) Social transfers	Average social transfers received by households (disposable income without transfers subtracted from disposable income with transfers), logarithmic	EU-SILC
Education expenditure	General government expenditure on education as a percentage of GDP (including primary, secondary and tertiary)	Eurostat
Healthcare expenditure	General government expenditure on healthcare as a percentage of GDP	Eurostat
Pensions expenditure	General government expenditure on old-age pensions as a percentage of GDP	Eurostat
Unemployment benefit	Unemployment benefit as a percentage of GDP (all schemes)	Eurostat
Family and children benefit	Family or child allowance as a percentage of GDP (all schemes)	Eurostat
Share of primary educated	Share of low educated in the country (lower secondary education or below)	EU-SILC
Employment rate	Employment rate (15-64 years), percentage of population aged 15-64 employed	Eurostat
Share of large households	Share of individuals in the country living in large households (with more than 4 members)	EU-SILC
Share of young people	Share of young (18-29) in the population	EU-SILC
Share of urban population	Population living in urban or intermediate areas as % of total	EU-SILC
Savings rate	Household savings as a percentage of GDP	Eurostat
(Log) Tourism per capita	Number of participants in domestic tourism (4 or more overnight stays) per capita, logarithmic	Eurostat
(Log) Vehicles per capita	Stock of vehicles (all vehicles except trailers and motorcycles) per capita in thousands, logarithmic	Eurostat

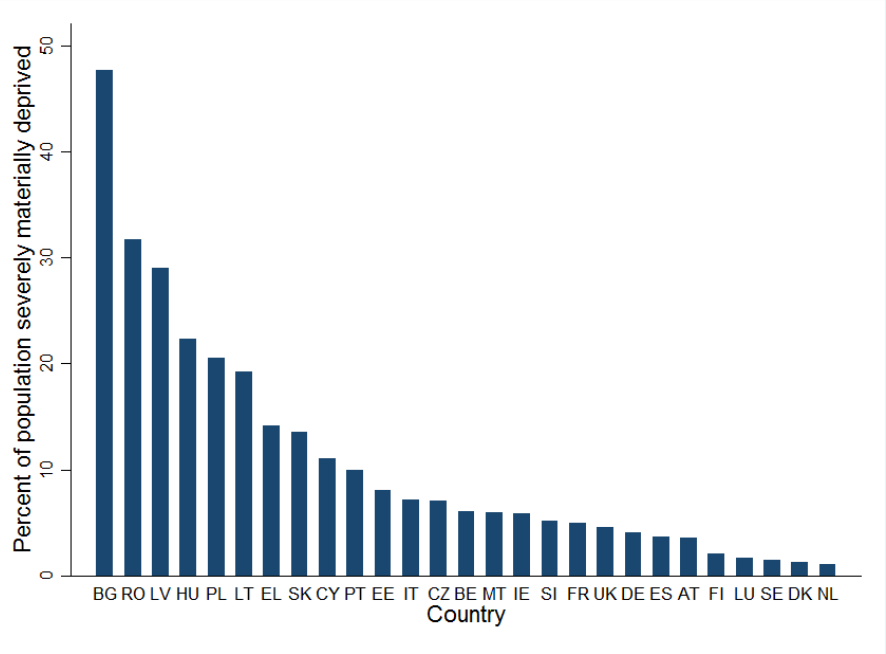
A fixed effects model to analyse the panel data, including country as well as time fixed effects, is also defined, which controls for all (observed and unobserved) year-specific country-invariant and country-specific time-invariant factors. The regression results can,

[6] The modified OECD scale is used to equalise household disposable household incomes. Household incomes are equalized in the following way: 1+0.5*(number of household members aged 14 or more years - 1) + 0.3*(number of household members aged 13 or less years).

therefore, be interpreted as the relationship between differences in SMD rates from the country and annual average and differences in each of the explanatory variables from the country and annual average. It is, of course, not possible to demonstrate a causal relationship using this method, because time-variant country-specific unobserved factors cannot be controlled for. The results are tested for multicollinearity to avoid identification problems in the model.[7]

SMD rates show a wide dispersion across countries, as noted above. Average severe material deprivation rates for the period 2005-2012 vary from over 40% in Bulgaria and around 30% in Romania and Latvia to less than 5% in Luxembourg, Sweden, Denmark and the Netherlands (Figure 5).

Figure 5. Mean severe material deprivation rate by country, average 2005-2012



Note: material deprivation rates are averaged in the period 2005-2012
Source: Eurostat, EU-SILC, 2005-2012 and authors' calculations

The EU12 countries mostly have relatively high rates except for Slovenia, Malta and the Czech Republic. In most countries with relatively low rates, there is not much change in rates over time, while among countries with relatively high rates, rates are more volatile, without showing any particular tendency to increase or decline in most countries.

Table 2 summarises the most important statistical characteristics of the potential determinants, or drivers, of SMD rates. For most of the variables, there are more than 200 observations, implying that the dataset is close to being balanced.

[7] While multicollinearity does not lead to bias in the coefficients or standard errors, it prevents us from knowing the exact effect of the explanatory variables on the dependent variable.

Table 2. Summary **statistics**

Variable	Obs.	Mean	St. deviation	Minimum	Maximum
Severe material deprivation rate	209	0.104	0.107	0.006	0.589
Log disposable income	209	10.069	0.746	8.201	11.194
Poverty gap	213	21.292	4.575	13.500	34.800
Log Social transfers	209	7.714	0.931	5.234	9.340
Education expenditure	216	6.222	1.466	2.700	8.900
Healthcare expenditure	216	5.482	1.047	3.000	8.100
Pensions expenditure	216	7.356	2.012	2.700	12.300
Unemployment benefit expenditure	216	0.706	0.570	0.100	2.600
Family and children benefit expenditure	216	0.885	0.564	0.100	2.700
Share of Primary Educated	209	0.287	0.161	0.071	0.721
Employment rate	216	64.523	5.933	50.800	77.900
Share of Large Households	209	0.189	0.056	0.077	0.322
Share of Young People	209	0.159	0.029	0.109	0.240
Share of Urban population	209	0.555	0.241	0	1
Savings rate	183	5.810	2.327	0.880	14.160
Log Vehicles	201	8.294	1.45	5.553	10.850
Log Tourism	177	-2.064	.993	-8.263	-.975

Note: More details about the definition and units of variables can be found in Table 1
Source: Eurostat, EU-SILC, 2009 and authors' calculations

Correlation results

The first step in investigating the drivers of SMD rates is to examine the unconditional correlation between the different variables and the SMD rate (see Table 3).

In line with expectations, SMD rates show the highest correlation with average disposable income; the higher the latter, the lower the former. Social transfers, poverty gap and healthcare expenditure are also highly correlated with SMD rates. More social transfers and expenditure on public healthcare is associated with lower rates, more inequality with higher rates.

Spending on unemployment benefits and employment rates are also highly correlated with SMD rates, in both cases the latter being lower, the higher the former two.

Other institutional variables, specifically expenditure on the public pension system and education and family benefits are only moderately correlated with SMD rates, with again the latter being lower the higher the values for the former variables. Among the indicators of population structure, share of people living in urban areas is not significantly correlated with SMD rates.

The share of large households is positively correlated with SMD rates, which seems to imply that for any given level of disposable income, larger households are more prone to severe material deprivation than smaller ones, which may mean that the way income is equivalised does not capture differences in spending needs.

Cultural differences do not show a very strong relationship with deprivation rates. The only significant variable from this group is the savings rate, a higher rate being associated with a lower SMD rate, though the coefficient is relatively small, implying that any effect is also small, there is no significant correlation for the stock of vehicles and participation in tourism. This implies either that cultural differences do not affect material deprivation rates or the choice of cultural variables is not appropriate. The regression analysis, however, needs to be undertaken before any firm conclusions can be drawn, since country- or time-specific effects might bias the results.

Table 3. Correlation of explanatory variables with the severe material deprivation rate

Variable	Severe MD	Disposable income (log)
Disposable income (log)	-0.828*	
Poverty gap	0.670*	-0.630*
Social transfers (log)	-0.764*	0.920*
Healthcare expenditures	-0.612*	0.570*
Education expenditures	-0.342*	0.329*
Pensions expenditure	-0.269*	0.356*
Unemployment benefit expenditure	-0.413*	0.522*
Family benefit expenditure	-0.319*	0.521*
Share of low educated (% of pop)	-0.022	0.127
Employment rate	-0.511*	0.526*
Share of large households (% of pop)	0.320*	-0.254*
Share of young people (% of pop)	0.174	-0.351*
Share of urban population (% of total pop)	-0.1249	0.2785*
Savings rate	-0.233*	0.315*
Stock of vehicles (log)	-0.151	0.140
Participation in tourism (log)	0.005	-0.100

** refers to coefficient significant on a 1% level*
Source: Eurostat, EU-SILC, 2009 and authors' calculations

As noted above, high correlations between explanatory variables may prevent any conclusion being drawn as to which of them matters most, so it is important to examine these (see Appendix B which sets out the whole correlation matrix). What seem to be the most important explanatory variables apart from level of disposable income inequality, social transfers, spending on healthcare, unemployment and family benefits, as well as the employment rate – are all highly correlated with disposable income. This implies that there may be significant multicollinearity in the regressions and this is tested in the following sections.

It is also of interest to see whether there is any time variation in the effect of the variables. Accordingly, the significance of the correlation with SMD rates is examined in each year separately (see Table 4). Across all periods, disposable income, poverty gap, social transfers and expenditure on healthcare are all significantly correlated with deprivation rates. Education expenditure and unemployment benefits seem important in some years.

The employment rate is closely correlated with deprivation in all years except 2008 and 2009. In most countries, employment rates fell significantly in these years because of the financial crisis. The temporary nature of the decrease in a number of countries – not all - may be an explanation. The results indicate that there is some variation in the significance of the correlation coefficients over time, which implies a need to include time-specific fixed effects in the regressions to prevent time differences from biasing the results.

Table 4. Correlation of explanatory variables with the material deprivation rate by year

Year	Significant correlation
2005	income, poverty gap, social transfer, healthcare, unemployment benefit, employment rate
2006	income, poverty gap, social transfer, healthcare, unemployment benefit, employment rate
2007	income, poverty gap, social transfer, healthcare, employment rate
2008	income, poverty gap, social transfer, healthcare
2009	income, poverty gap, social transfer, healthcare
2010	income, poverty gap, social transfer, healthcare, employment rate
2011	income, poverty gap, social transfer, healthcare, employment rate
2012	income, poverty gap, social transfer, healthcare, education, employment rate

Note: Correlations in the table are significant on a 1% level
Source: Eurostat, EU-SILC, 2009 and authors' calculations

Regression results

The section shows the results of carrying out panel regressions with country- and year-specific fixed effects. As noted above, the coefficients estimated by the regressions can be interpreted as the effect of the difference of the explanatory variable from its country- and year-specific average.

The baseline mode, which is subsequently complemented by the addition of further explanatory variables in some specifications, is:

$$matdep_{i,t} = \beta_0 + \beta_1 * dispincome_{i,t} + year_i + country_t + u_{i,t}$$

Where $matdep_{i,t}$ is the dependent variable, the severe material deprivation rate; $dispincome_{i,t}$ is disposable income[8]; $year_i$ is a year-specific fixed effect; $country_t$ is a country-specific fixed effect; and $u_{i,t}$ is the error term.

The regression results are considered in two parts. This section considers results from the models which included disposable income (Model 1), inequality (Model 2), disposable income, inequality and their interaction (Model 3), indicators of social policy (Model 4), indicators of population structure (Model 5), and all of these together (Model 6). The regression results are reported in Table 5. The analysis of the effect of cultural differences is considered in the next section.

[8] In other specifications, additional explanatory variables are included as well.

In the first and second models, only disposable income or inequality is included, the concern being to see how much of the variation in SMD can be explained by each of these alone. According to the results, disposable income that is 10% higher than the country-year average is associated with an SMD rate 1.9 percentage points lower than the country-year average. This is both a significant and relatively large effect indicating that disposable income is a major determinant of SMD rates, as expected. Accordingly, an effective way of reducing material deprivation rates is to increase disposable income.

A moderate but significant positive association is expected between inequality and SMD rates. The results show that a one unit higher poverty gap is associated with a 0.05 percentage point higher SMD rate. Inequality, therefore, seems on average to have a significantly smaller effect on deprivation than disposable income. At the same time, this changes dramatically in Model 3, where all disposable income, inequality and their interaction are included. The coefficient of disposable income falls, while the coefficient of the poverty gap increases. Moreover, the interaction becomes positively significant meaning that in richer countries a large poverty gap is associated with a smaller increase in SMD rates than in countries with lower disposable income.

In addition to disposable income and the poverty gap, social policy variables are included in Model 4, specifically expenditure on healthcare, education, and pensions; average social transfers, unemployment and family benefits. We expect that more generous social transfers and larger expenditures on public services are associated with lower material deprivation rates.

The results indicate, first, that parameter estimates for disposable income and the poverty gap remain highly significant and even increase, the coefficient for disposable income to around 0.9 and that of the poverty gap to almost 0.4. Secondly, average social transfers and expenditure on education and healthcare show a weakly significant association with SMD rates. At the same time, the coefficients on social transfers and expenditure on healthcare have a counterintuitive positive sign, implying that, for example, for a given level of disposable income, inequality, and expenditure on public services, social transfers 10% higher are on average associated with a SMD which is 0.3 of a percentage point higher. While these coefficients are significant at the 10% level, they are relatively small, except that for social transfers.

The coefficient for expenditure on education has the expected negative sign. All other explanatory variables included, higher spending on education is associated with lower SMD rates. This could reflect the smaller need for households to spend on education in countries where expenditure is high, leaving them more income to spend on other things. Expenditure on unemployment and family benefits does not have a significant effect in this specification. It may be that including overall average social benefits and unemployment and family benefits in the regression at the same time may be a reason for the latter two having no significant effect, since they are already included in the former.

In Model 5, disposable income and poverty gap are complemented by indicators of the structure of the population. The results indicate that the effect of income and inequality is still very important and the coefficients are similar to those in the previous models. Among the added variables, only the employment rate and the share of young people in the population are significant, while the share of urban (and intermediate) population is significant at a 10% level. Given the value of the other variables, a higher employment rate is associated with a lower SMD rate, though the coefficient is very small. A larger share of young people is associated with a higher SMD rate, reflecting perhaps the effect of a larger dependent population.

In Model 6, in which all explanatory variables are included, disposable income and the poverty gap, as well as their interaction again remain significant with the expected signs. From the other potential explanatory variables, only average social transfers, the share of young people and the share of large households are also significant.

Table 5. Regression models

	Income (Model 1)	Inequality (Model 2)	Income & Inequality (Model 3)	Welfare State (Model 4)	Society (Model 5)	All (Model 6)
Disposable Income (l)	-0.187***		-0.065***	-0.086***	-0.063**	-0.082***
	(0.015)		(0.025)	(0.029)	(0.024)	(0.028)
Poverty Gap		0.005***	0.043***	0.044***	0.042***	0.043***
		(0.001)	(0.007)	(0.007)	(0.007)	(0.007)
Disposable Income* Poverty Gap			-0.004***	-0.005***	-0.004***	-0.004***
			(0.001)	(0.001)	(0.001)	(0.001)
Social Transfers (l)				0.032**		0.026*
				(0.013)		(0.015)
Healthcare				0.008*		0.006
				(0.004)		(0.005)
Education				-0.010*		-0.008
				(0.006)		(0.006)
Pensions				0.004		0.001
				(0.003)		(0.004)
Unemployment Ben.				-0.007		-0.010
				(0.008)		(0.009)
Family Ben.				-0.002		0.006
				(0.014)		(0.014)
Low educated (%)					-0.007	-0.027
					(0.076)	(0.084)
Employment rate					-0.002***	-0.002
					(0.001)	(0.001)
Large house-holds (%)					-0.219	-0.258*
					(0.133)	(0.136)
Young					0.711***	0.662***
					(0.229)	(0.249)
Urban population (%)					0.034*	0.028
					(0.018)	(0.018)
Constant	1.839***	0.022	0.645***	0.586**	0.674***	0.644**
	(0.137)	(0.025)	(0.229)	(0.240)	(0.224)	(0.266)
Observations	209	209	209	209	209	209
R-squared	0.597	0.309	0.693	0.716	0.730	0.741
Number of countries	27	27	27	27	27	27
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
(L) refers to variables that are used standardized on a logarithmic scale.

Source: Eurostat, EU-SILC, 2005-2012 and authors' calculations

The coefficient of average social transfers has similar signs as in Model 4, higher levels being associated with higher SMD rates. The size of the coefficient is also similar to that in Model 4, although significance levels are lower. Besides social transfers, the share of young people in the society is also highly significant, implying that a large dependent population has a positive association with high SMD rates. The share of large households is associated with lower material deprivation levels, which is counter-intuitive, but this relationship is only significant at the 10% level.

However, in this specification, previously significant coefficients of expenditure on healthcare, education, the share of urban population and the employment rate are no longer significant. This may be interpreted that in the explanation of SMD rates, disposable income and the poverty gap still seem to be the most important variables.

Items of material deprivation and cultural differences

In theory, cross-country comparability of material deprivation rates is ensured by the common nature of the items included in the deprivation indicator. But what if people in different countries have different perceptions about what "going on a holiday" means or how much saving is enough? This section examines the relationship, first, between the three cultural indicators defined above – the savings rate, participation in tourism and the stock of vehicles – and the items which make up the deprivation indicator, and secondly between the same indicators and aggregate SMD rates. We use three explanatory variables – savings rate, participation in tourism and stock of vehicles – to look at cross-country differences related to the interpretation of deprivation items. A short explanation for the choice of variables is given in the next paragraphs.

We included stock of vehicles in the analysis, because we expected it to be correlated with the item "Being able to afford a car". More vehicles per capita obviously have a first order effect of less people being deprived from a car, and hence it can be expected to show a negative correlation with material deprivation rates. The interaction between disposable income and car ownership, however, is expected to have a positive sign. This means people without a car in countries with more cars are more likely to consider themselves deprived.

In case of participation in tourism, the logic is somewhat similar. We assume that people's perceptions about vacation may vary across countries. If more people go on a vacation in the country, holidays are expected to be considered a necessity by more people. Here the first order effect is that more tourist nights per capita mean less people deprived from tourism. At the same time, if participation in tourism is high in general, people not being able to afford a week of holiday may consider themselves even more deprived. Accordingly, we include the interaction between participation in tourism and disposable income in the model.

The relationship between savings rate and "Able to cover unexpected expenses" is quite straightforward. In countries with higher savings rate, people will be more able to react to negative financial shocks, even after controlling for disposable income. At the same time, a secondary effect implies that in countries where the propensity to save is higher, people feeling not being able to face unexpected expenses will more likely report themselves deprived. In case of either a high income or a high savings rate, the capacity to cover unexpected expenses is expected to be higher, thus deprivation rate can be expected to be lower. But in case of both a high income and a high savings rate, the deprivation rate is expected to be higher, and their interaction is expected to have a positive coefficient.

Results of the correlation analysis are reported in Table 6. The stock of vehicles is not significantly related to "being able to afford a car", nor is participation in tourism related to "being able to afford a vacation". On the other hand, the savings rate and "being able to cover unexpected expenses" show a significant negative relationship. Although the coefficient is not very high, it is worth investigating this association further by explicitly taking account of income and inequality differences.

Table 6. Correlation between items and cultural variables

Variable1	Variable2	Correlation
Savings rate	Cover unexpected expenses	-0.2405*
Stock of Vehicles	Able to Afford a Car	-0.1691
Participation in Tourism	Able to Afford a Vacation	-0.0328

Source: Eurostat, EU-SILC, 2005-2012 and authors' calculations

Results of panel regressions, with country and year fixed effects and including disposable income and the poverty gap, are shown in Table 7. In each estimation, the dependent variable is an item of the deprivation rate, and the main explanatory variables are the cultural variable and its interaction with disposable income. The interest is in the first order effect of the cultural indicator on the respective items, measured by the coefficient of the indicator, but is also in the second order effect, measured by the coefficient of the interaction terms.

Table 7. Regression models 2: items and cultural variables

	Able to cover unexpected expenses	Able to afford a car	Able to go on vacation
Disposable income	-0.250***	-0.300***	-0.147***
	(0.045)	(0.064)	(0.036)
Poverty gap	0.001	0.002**	0.004***
	(0.002)	(0.001)	(0.001)
Savings rate	-0.066**		
	(0.029)		
Savings rate*Disposable income	0.006*		
	(0.003)		
Stock of vehicles (l)		-0.267***	
		(0.082)	
Stock of vehicles*Disposable income		0.022***	
		(0.008)	
Participation in tourism (l)			-0.353***
			(0.103)
Tourism*Disposable income			0.035***
			(0.010)
Constant	2.722***	3.360***	1.605***
	(0.416)	(0.607)	(0.341)
Observations	181	194	177
R-squared	0.465	0.604	0.492
Number of countries	23	27	27
Country FE	YES	YES	YES
Year FE	YES	YES	YES

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

(L) refers to variables that are used standardized on a logarithmic scale.

Source: Eurostat, EU-SILC, 2005-2012 and authors' calculations

In contrast to the correlation analysis, the regression results show a significant association with the relevant item in the SMD indicator in all models. The savings rate is significantly negatively associated with "being able to cover unexpected expenses", a country with a higher savings rate tending to have a smaller share of households not able to cover unexpected expenses. At the same time, a country that has high disposable income *and* high savings rate is expected to be less able to cover unexpected expenses than it would be on the basis only of the first order effect of disposable income and the savings rate. This means that the attitude towards savings seems to have a significant effect, in that in a country with high disposable income, the deprivation-lowering effect of a higher saving rate tends to be weaker.

The results are similar for cars and holidays. The models show significant coefficients for disposable income, the cultural indicator concerned and the interaction of the two. If disposable income is high in a country, then the deprivation-lowering effect of a high stock of vehicles tends to be smaller, as more people report being deprived of a car than implied by the primary effect of disposable income and the stock of vehicles. Similarly in a country where disposable income is high and more people go on holiday, more people tend to report being unable to go on holiday than implied by the high disposable income and participation in tourism.

This implies that there is a difference in the attitude of people in different countries towards the same items. At the same time, it does not demonstrate that there is anything wrong with the aggregate material deprivation indicator as these differences may not be statistically significant at the level of the aggregate indicator. To examine this, a model can be used to estimate SMD rates which includes disposable income, the poverty gap, the cultural indicators and their interaction with disposable income. A comprehensive model including all the variables examined above can also be estimated. The results are set out in Table 8.

In the first column of the table, disposable income and poverty gap remain still highly significant with a relatively stable coefficient. Given the value of these, it a higher savings rate is expected to be associated with lower deprivation, but the interaction of the savings rate and disposable income is expected to have a positive coefficient. The effects are as expected and highly significant.

A larger stock of vehicles and higher participation in tourism are also expected to be associated with higher SMD rates. However neither the stock of vehicles, nor participation in tourism, nor any of their interactions with disposable income have significant coefficients in the regression. Accordingly, the aggregate deprivation indicator is influenced only by the combined effect of the savings rate and disposable income. There is no significant association of the stock of vehicles or participation in tourism with deprivation at the aggregate level.

The model shown in second column of Table 8 ("All") includes all the variables examined above, while the one in the third column (the "Final" model) includes only the variables that are significant in the previous one. The "Final" model can therefore be regarded as the best model for predicting SMD rates.

Based on this, the overall conclusion is that disposable income and inequality measured by the poverty gap are significant drivers of material deprivation rates, their coefficients remaining of a similar size as in earlier specifications. A higher average disposable income is associated with a lower SMD rate, a wider poverty gap with a higher SMD rate. In higher income countries, the SMD increasing effect of a wider poverty gap seems to be smaller.

While according to the model including all possible explanatory variables employment rate and the share of urban population seem to be significantly associated with the SMD rate, in the final model, the coefficient of employment rate entirely loses its significance. Share of urban households in the population remains significant on a 10% level, being associate with higher SMD rates.

Moreover, interestingly, savings rate as well as its interaction with disposable income remain highly significant even in the final model. While a higher savings rate is associated

with a significantly lower SMD rate, this effect is reduced by the interaction between savings and income, where in a high income country, a higher savings rate reduces lower SMD rates less than in a lower income country.

As already mentioned, the variables are in many cases closely correlated with each other. While this does not bias the standard errors, the model can only estimate the explanatory power of all the variables included together, and is not able to distinguish which of them is the most important in this respect. All the models, including those ones in the previous section, however, were tested for multicollinearity (detailed results are reported in Appendix C) and all pass the tolerance test (i.e. the variance inflation factor, VIF, is sufficiently low). The sensitivity of the matrix was also checked by the condition number test, which confirmed the reliability of the models.

Table 8. Regression models 2: items and cultural variables

	Culture and Attitudes	All	Final
Disposable Income (l)	-0.180	-0.178	-0.124***
	(0.110)	(0.118)	(0.031)
Poverty Gap	0.002**	0.028**	0.040***
	(0.001)	(0.013)	(0.008)
Disposable Income*Poverty		-0.003**	-0.004***
		(0.001)	(0.001)
Social Transfers (l)		-0.001	
		(0.022)	
Healthcare		0.009	
		(0.006)	
Education		0.012	
		(0.009)	
Pensions		-0.008	
		(0.005)	
Unemployment Ben.		-0.009	
		(0.015)	
Family Ben.		0.002	
		(0.023)	
Low educated (%)		-0.134	
		(0.109)	
Employment rate		-0.005**	-0.001
		(0.002)	(0.001)
Large households (%)		-0.235	
		(0.203)	
Young		0.451	
		(0.353)	
Urban households (%)		0.139**	0.080*
		(0.061)	(0.042)
Savings rate	-0.082***	-0.071**	-0.042***
	(0.029)	(0.029)	(0.013)
Savings rate*Disposable	0.009***	0.008**	0.004***
	(0.003)	(0.003)	(0.001)
Stock of vehicles (l)	0.066	-0.068	
	(0.121)	(0.127)	
Stock of vehicles*Disposable	-0.011	0.002	
	(0.013)	(0.013)	
Participation in tourism (l)	-0.105	-0.122	
	(0.103)	(0.126)	
Tourism*Disposable income	0.012	0.012	
	(0.012)	(0.014)	

	Culture and Attitudes	All	Final
Constant	2.036*	2.283**	1.258***
	(1.028)	(1.076)	(0.297)
Observations	143	143	181
R-squared	0.742	0.809	0.741
Number of countries	23	23	23
Country FE	YES	YES	YES
Year FE	YES	YES	YES

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
(L) refers to variables that are used standardized on a logarithmic scale.

Source: Eurostat, EU-SILC, 2005-2012 and authors' calculations

Concluding remarks

This study has investigated various potential determinants of SMD rates. The most important is disposable income, which is in line with expectations. The relationship remains close and significant irrespective of what other factors are taken into account, indicating that an increase in income has a direct effect in reducing the country-level severe material deprivation rate.

Deprivation is also affected by the degree of inequality of income measured by the poverty gap in this study. Even if disposable income is the same, a less unequal distribution tends to imply a lower material deprivation rate. Moreover, the analysis shows that in high income countries, a wider poverty gap is associated with a higher SMD rate to a lesser extent than in low income countries.

The effect of savings is more complicated. A higher savings rate implies a lower rate of deprivation, since, for example, households are more likely to be able to face unexpected expenses. At the same time, while in countries with both high income and high savings, the deprivation rate is low, it tends, nevertheless, to be higher than these two factors separately imply. This is perhaps explained by cultural differences: in the sense that in countries where saving is considered a higher priority, household need more savings to feel confident in being able to cover unexpected expenses with consequent implications on their ability to afford the items included in the deprivation indicator.

Other potential determinants seem to affect the deprivation rate through their effect on the above factors, especially disposable income. The subjectivity of the items of the material deprivation indicator has been criticized many times, but the overall indicator usually proved to be statistically reliable. We use three subjective variables in the study to check whether there is any observable heterogeneity across countries in subjective perceptions towards these items. Regression results imply that the aggregate material deprivation indicator can be considered statistically robust. However, it is important to realise that certain variables, for example the poverty gap or the savings rate in our analysis, may have a primary and a secondary effect as well, that matter for the determination of SMD rates.

It is clear that an analysis of a larger sample would have improved the robustness of the results and consideration was given to including regional data – i.e. data at the NUTS 1 or 2 level – to increase the number of observations. The limited availability and lack of compatibility of the data, however, meant that such an extension of the analysis was difficult at present, though this remains a possibility should more and better regional data become available.

The results, of course, need to be interpreted with caution despite their relative robustness. In particular, although there is an evident close relationship between the different factors indicated above and the SMD rate, it does not necessarily mean that there is a causal relationship, that, for example, an increase in disposable income would lead to a reduction in the deprivation rate. This is explored further in the next part of the Research Note which examines the relationship between household disposable income and material deprivation

on the basis of longitudinal data, investigating the effect of a change in the former on the latter for particular households in different EU countries.

Part 2: Micro drivers of material deprivation: the effect of income on deprivation

Introduction

The above analysis shows that there is a close relationship across countries between the level of disposable income and the proportion of the population who are materially deprived. This part of the Research Note carries the analysis further by exploring the relationship between changes in the disposable income of households and whether they become materially deprived or not. The latter is measured again by the indicator developed from the EU-SILC data which relates to the affordability of particular items. The concern is to examine the extent to which the ability of households to afford these items both in aggregate and individually is affected by changes in their income.

The analysis is based on the longitudinal data collected by the EU-SILC which enables individual households and their members to be tracked over a period of time. The full longitudinal data covers a 4-year period but since the households tracked over this length of time represent only 25% of the total covered by the EU-SILC, which accordingly tends to give rise to serious problems of inadequate sample size in terms of their representativeness, a 3-year period is taken instead. This enables the sample size to be increased to 50% of the total households surveyed with consequent gains in their representativeness. While it means that a shorter period is covered, it is still long enough to explore possible lags in the relationship between changes in income and the affordability of the items which make up the indicator of material deprivation, though it involves some estimation as explained below.

The analysis essentially represents a follow-up to a broader study by Anne-Catherine Guio and Marco Pomati[9], which was concerned to examine coping strategies by households in the EU in the crisis and after suffering shocks of different kinds, such as a job loss, and the items of expenditure that they tended to give up first. This also made use of the EU-SILC longitudinal data, in this case, the data for the years 2009-2011. It found that the loss of employment, as might be expected, was significantly linked with suffering a reduction in income to below the at risk of poverty threshold and becoming materially deprived, while taking up part-time work, while it tended to lead to a loss of income, did not necessarily result in deprivation. It also found that becoming ill or experiencing a marriage or partnership break-up increased the risk of becoming both at risk of poverty and materially deprived. A further finding is that there tended to be a certain order in which items become no longer affordable, or on which spending is curtailed, when a person loses their job, with holidays being the first in line, together with an inability to meet unexpected expenses.

Unlike the Guio-Pomati study, the analysis below confines itself to examining the relationship between material deprivation and major reductions in household income directly rather than those associated with particular disruptive life events. It also examines the effect of major increases in income on those who are already materially deprived as well as the possible lag in the relationship. It is focused too on the years after the recession, rather than the recession years themselves[10].

The focus is on the change in the proportion of households measured as being materially deprived in the years 2011 and 2012 (i.e. at the time of the survey in both cases), according to the indicator based on the EU-SILC data and the relationship of this with the change in household income, measured in real terms (i.e. deflated by the consumer price

[9] 'How do European citizens cope with economic shock? Expenditures that households in hardship are curtailing first.'

[10] In this it follows, the European Commission Working Paper on 'Poverty dynamics in Europe' (03/2015) which focuses on those at risk of poverty but also briefly considers material deprivation (29-30): http://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=7852&furtherPubs=yes

index). The latter relates to the years 2010-2012, as indicated by the survey conducted one year later[11], reflecting the inherent lag between the period to which income relates in the EU-SILC and household circumstances which are recorded at the time of the survey[12]. It can be argued that since households may tend to respond in their spending behaviour to any changes in income with a lag – that it takes time for, say, a reduction in income to lead to a downscaling of consumption since most households are likely to have some accumulated savings to fall back on and initially at least the reduction may be regarded as temporary – then indicators of deprivation are in any case likely to be related more closely to previous income than current. Whether this is the case or not is one of the issues examined here.

Household income, equivalised to adjust for differences in household size and composition, is converted to real, or constant price, terms on the basis of the Harmonised Index of Consumer Prices (HICPs) in each of the countries for which longitudinal data exist. The households covered are confined to those which reported positive income in all three of these years to avoid problems of interpreting changes when income is zero or negative. They also exclude any households with self-employment earnings because of the difficulties of measuring this and the question-mark over the way that it is defined in the EU-SILC. (Specifically, it is defined as the net trading income of the self-employed which may not reflect at all the purchasing power that they have access to.) In addition, coverage is limited to households with at least one member of working age (defined as 18-64), since those with people older than this are likely to display a somewhat different behaviour and those receiving old-age pensions are unlikely in most cases to experience a substantial decline in real income. The countries included are all the EU Member States except Germany, Greece, Romania and Sweden, for which longitudinal data are not publicly available in the EU-SILC[13], and Croatia, for which there are data only for the last two years of the period.

Changes in material deprivation and income

To begin with the overall developments over the period 2011 to 2012, the relative number of people materially deprived – or more precisely living in households reporting to be unable to afford three of the 9 items making up the material deprivation indicator – increased in the EU (or in the 23 Member States for which there are data) by just under 2 percentage points (Table 1 – note that this is based on longitudinal data so the figures will differ from those recorded by the full EU-SILC; they are also confined to households with at least one person aged 18-64 and with no self-employment income).

At the same time, real household income on average remained unchanged between 2010 and 2011 and fell by 2.5 percentage points over the following year. A reduction in income over the period 2010-2012 was, therefore, associated with an increase in the proportion of people materially deprived.

[11] More specifically, for all countries apart from Ireland and the UK, the income relates to the calendar year before the survey. For Ireland, however, it relates to the 12 months preceding the survey rather than the calendar year, which means that the lag between the income reported and the survey is shorter than for other countries. For the UK, income relates to the previous tax year, which runs from April to March, so that the lag between income and the survey is also slightly shorter in most cases, except for those people interviewed in the first quarter of the year.

[12] It should be noted that there was also the option of including the situation relating to material deprivation at the time of the 2013 survey, but although this could be related to the change in income between 2011 and 2012, it would not be possible to take account of the change in income between 2012 and 2013 which can also affect the situation.

[13] More specifically, data are not included for these countries in the microdata set which is available to researchers.

Table 1 Change in proportion of people materially deprived, 2011-2011 and the change in household real income, 2010-2011 and 2011-2012

	Deprived (%)		Change	% change income 2010-11			% change income 2010-12		
	2011	2012	2011-12	<-10%	>10%	Median	<-10%	>10%	Median
BE	14.9	14.9	0.0	22.8	27.6	0.7	22.1	35.6	2.3
BG	63.0	65.0	2.0	40.2	23.6	-4.5	36.7	31.7	-2.9
CZ	18.6	18.7	0.1	15.7	29.2	2.9	24.9	29.4	0.7
DK	12.1	16.5	4.4	15.6	29.4	-0.2	26.3	31.2	-1.2
EE	23.2	21.8	-1.5	29.4	32.7	-2.0	28.6	40.4	3.5
IE	26.0	27.9	1.9	38.7	19.8	-6.3	50.7	18.5	-10.0
ES	14.0	16.1	2.0	30.5	22.7	-2.3	47.8	21.5	-8.8
FR	14.5	14.9	0.4	22.7	25.0	0.0	28.4	27.2	-1.3
IT	20.3	25.4	5.0	28.0	23.0	-1.8	40.6	20.9	-6.2
CY	27.3	29.1	1.8	23.0	18.0	-0.9	44.8	18.2	-7.6
LV	49.0	43.1	-5.8	31.9	33.2	-0.3	29.7	42.9	3.4
LT	35.5	36.9	1.4	17.2	48.2	8.7	21.2	49.8	9.8
LU	4.4	3.7	-0.7	28.0	20.3	-2.5	31.2	27.1	-2.4
HU	50.0	51.4	1.4	29.8	26.8	-2.0	53.1	18.4	-11.8
MT	20.8	19.3	-1.6	15.4	23.0	1.2	20.7	34.1	2.2
NL	7.3	7.9	0.6	17.1	17.3	-0.4	25.2	20.0	-1.8
AT	14.2	13.7	-0.5	26.3	21.2	-2.0	30.4	27.8	-2.2
PL	28.4	29.0	0.7	26.7	26.1	-2.4	34.4	30.1	-2.8
PT	23.5	24.6	1.1	44.1	17.7	-7.8	53.7	19.2	-12.5
SI	16.2	17.8	1.6	17.4	18.7	-0.3	32.7	18.3	-4.1
SK	23.9	24.9	1.0	20.4	34.1	3.6	29.6	29.0	-2.2
FI	8.8	9.8	1.0	17.2	24.7	1.1	19.8	32.1	2.4
UK	18.0	21.0	3.1	21.9	50.0	10.0	26.4	43.0	4.9
EU	19.8	21.6	1.8	25.4	28.9	0.0	34.0	28.7	-2.5

Note: Households are confined to those containing at least one person aged 18-64 and with no income from self-employment. The figures under the '% change in income' show the % of people whose real disposable income fell by 10% or more and rose by 10% or more as well as the median change.
Source: Eurostat, EU-SILC 2013 longitudinal data and authors' calculations.

Real income also fell in most Member States over the period 2010-2012 and in each case, apart from Luxembourg and Austria, the relative number of people materially deprived increased between 2011 and 2012, though to differing extents[14]. Real income increased over the period in 8 countries and in 5 of these, the proportion of people materially deprived either declined or remained unchanged (in Belgium and the Czech Republic). In Lithuania, however, income increased substantially but the relative number of deprived also rose. Income increased as well in Finland and the UK, if by less, and in each case, this was also accompanied by an increase in material deprivation, though in the UK, there was a significant fall of income in 2011-2012 which offers a potential explanation. It is also the case that the average change in income can have differing potential effects on the rate of material deprivation according to the way that it is distributed across the population and how it affects people with different levels of initial income. In particular, it is likely to have more effect if it is concentrated among those with incomes which are already relatively low than if it is concentrated among higher income earners.

The variation across countries in the median change in real income is matched by an equally wide difference in the change in income between households within countries. In those in which income fell on average, a significant proportion of households, nevertheless, experienced an increase of 10% or more. Similarly, in those where income increased, many people experienced a significant reduction in income, in some cases, a larger proportion

[14] Note that ideally the relative number of people materially deprived in 2010 should also be examined but this would require 4 years of longitudinal data instead of three – i.e. data from the 2010 survey as well as from the 2011, 2012 and 2013 surveys – with a consequent halving of the number of observations.

than in countries where income fell (this is the case, for example, in Latvia as compared with Denmark, France or the Netherlands).

In practice, only around 5% of those who were not deprived in the EU in 2011 and experienced a reduction in household disposable income of 10% or more over the period 2010-2011 or 2011-2012 had income below 60% of the median, the figure being over 7% only in Spain (Table 2)[15]. This means that the people with income below this level – i.e. those at risk of poverty – were very much less likely on average to experience such a reduction in income than those with higher levels (i.e. the odds ratios are less than 1).

Table 2 Proportion of selected groups whose income fell by 10% or more in either 2010-2011 or 2011-2012

	% of those whose income fell by 10%+				Odds ratio*			
	<60% of median	60% to median	Children <18	People 60+	<60% of median	60% to median	Children <18	People 60+
BE	5.3	59.6	21.1	10.6	0.63	1.57	0.96	1.18
BG	0.2	36.0	18.4	13.2	0.13	1.27	1.12	0.97
CZ	1.5	52.9	23.4	8.5	0.27	1.30	1.23	0.67
DK	0.0	72.9	22.6	15.0	0.00	1.37	1.13	1.41
EE	3.2	51.6	0.0	14.5	0.39	1.45	1.24	1.14
IE	2.2	46.0	24.6	12.7	0.23	1.10	1.11	1.07
ES	8.4	58.1	30.0	8.9	0.66	1.38	0.99	0.88
FR	4.7	58.9	0.0	12.5	0.54	1.31	0.85	1.19
IT	7.8	57.4	23.1	12.0	0.64	1.37	1.08	0.77
CY	2.6	47.5	20.1	6.2	0.40	1.52	1.00	0.64
LV	2.7	45.0	0.0	13.0	0.44	1.67	1.03	0.95
LT	2.0	56.6	20.3	7.8	0.18	1.66	1.54	0.75
LU	6.8	63.3	24.9	8.1	0.53	1.30	1.14	0.97
HU	0.8	33.0	20.2	12.2	0.21	0.94	0.75	0.90
MT	6.6	52.5	32.3	12.7	0.65	1.41	0.90	0.86
NL	7.1	59.0	27.1	9.8	0.61	1.30	0.96	1.27
AT	7.2	67.7	14.6	10.7	0.70	1.37	0.95	1.05
PL	2.5	52.2	19.3	11.3	0.32	1.43	1.14	0.86
PT	2.0	41.1	23.6	11.6	0.22	1.05	1.06	0.79
SI	3.9	56.9	21.7	10.5	0.53	1.60	0.91	1.12
SK	0.6	55.8	22.8	15.0	0.12	1.55	1.12	1.10
FI	3.0	61.2	20.4	15.6	0.32	1.48	0.84	1.70
UK	4.1	63.7	0.0	11.6	0.38	1.59	1.05	1.15
EU	5.1	56.2	20.6	11.3	0.52	1.36	0.99	0.99

Note: The figures relate only to those who were not materially deprived in 2011 and whose income fell by 10% or more either in 2010-2011 or 2011-2012>Shaded figures denote instances where those whose income fell by 10% or more are less likely to be in the age group concerned.

** Relative to all people who were not deprived in 2011*

Source: Eurostat, EU-SILC 2013 longitudinal data and authors' calculations.

On the other hand, those with income below the median were significantly more likely to experience a reduction in income of this size (the odds ratios are greater than 1). Indeed, around 56% of all those in the EU whose income fell by 10% or more over the period had

[15] More specifically, the group concerned are people whose income fell by at least 10% over the period 2010-2012 and who experienced a reduction in income of 10% or more in either of the two years. This is to exclude those whose income fell by 10% or more in the first year but for whom it increased significantly in the second year.

income initially which was below the median. This is around 36% more than the share of the people concerned among the non-deprived. People with income below the median were disproportionately likely to experience a decline in income on this scale in all countries without exception, though this was less the case in Hungary and Portugal than elsewhere. It was especially the case in Latvia and Lithuania, where the share of those whose income fell by at least 10% was around 75% larger than their share among the non-deprived.

Both children and older people aged 60 and over were no more likely, on average, to experience a reduction in household income of this size than other age groups, though this was not the case in all Member States. Indeed, in the majority of Member States, they were more likely to, most especially in the case of children in the Czech Republic, Slovakia and, above all, in Lithuania, and in the case of older people, in the Netherlands, Finland and, most especially, in Denmark.

With regard to other groups, young people aged 18-24 were slightly less likely to experience a reduction of income on this scale than other age groups, the only exceptions being France, Italy, the UK and Latvia, while women were no more likely in most countries to do so than men.

The remainder of the analysis examines the relationship between changes in income and deprivation more closely. It focuses on those who experienced a substantial change in real income, both down and up of 10% or more, since such changes would be expected to have most effect on their material deprivation status, and examines the extent to which it changed in practice. It considers both the 'short-term' relationship between income changes and households becoming materially deprived – i.e. between the change in income in 2011-2012 and the change in deprivation status between 2011 and 2012 – and the longer-term relationship, between the change in income in 2010-2011 and again the change in deprivation status between 2011 and 2012.

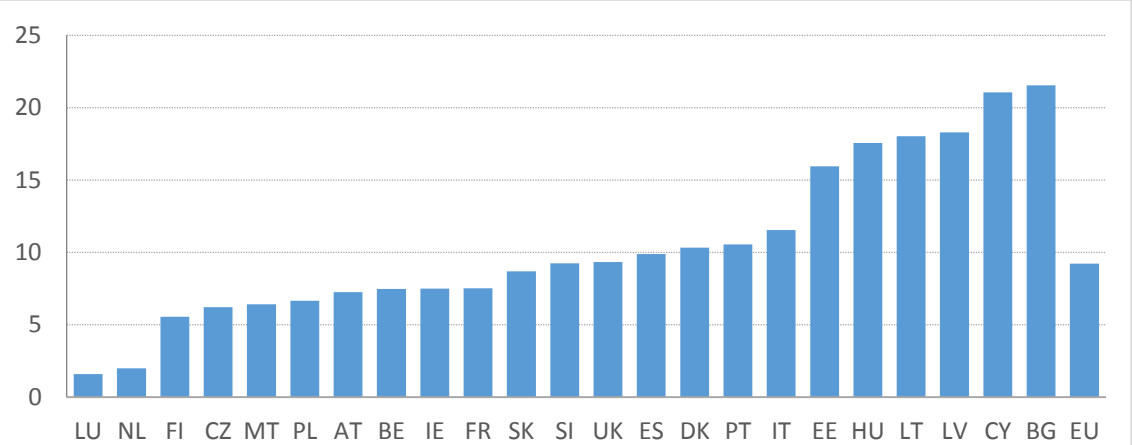
Effect of changes in income on material deprivation status

The effect of a reduction in income

To examine, first, the short-term effects over the EU as whole, just over 9% of those who were not materially deprived in 2011 and who experienced a reduction of at least 10% in real disposable income between 2011 and 2012 became deprived by 2012 (Figure 1). The extent of the increase in material deprivation, however, varies considerably between countries. Whereas the proportion of the group in question that became material deprived increased by only around 2 percentage points in Luxembourg and the Netherlands, both high-income countries where the overall number of deprived households is small, it rose by over 15% in Estonia, Hungary, Lithuania and Latvia and over 20% in Cyprus and Bulgaria, in all of which, except the first, the overall number is relatively large.

In practice, therefore, only a minor proportion of households suffering a large reduction in income became materially deprived – in most countries, less than 10%. This, of course, is only to be expected in the sense that those with relatively high income levels would still be relatively prosperous even after a decline of income of this size. There is, therefore, likely to be a relationship between the initial level of income and the probability of becoming deprived. The nature of the indicator reinforces this. Since it is based on households not being able to afford three out of 9 selected items, a household which is already unable to afford two of the three items, which will tend to be a household with a relatively low level of income, is more likely to become unable to afford a third item than one with a higher level of income which initially can afford all items or 8 of the 9.

Figure 1 Proportion of those not materially deprived in 2011 and whose income fell by 10% or more in 2011-2012 who were deprived in 2012 (%)



Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

The households which became materially deprived in the EU, therefore, had, on average, an initial level of income which was 13% below the median, whereas the average income of those that remained non-deprived was around 33% above the median (Table 3). A difference in income of a similar scale is evident in all countries. As expected, therefore, the initial level of income seems to be an important determinant of whether someone becomes materially deprived or not when they suffer a significant income loss.

Table 3 Household disposable income in 2011 relative to the median of those who became deprived and those who did not among those who experienced a reduction of 10% or more in income, 2011-2012 (Median=100)

	Not deprived in both years	Became deprived	Total
Belgium	122.2	*82.3*	119.2
Bulgaria	174.3	137.3	166.3
Czech Republic	130.9	102.9	129.2
Denmark	99.5		93.1
Estonia	149.2	107.7	142.6
Ireland	132.8	*71.3*	128.2
Spain	143.2	85.5	137.5
France	124.5	89.1	121.8
Italy	121.0	84.3	116.8
Cyprus	148.6	103.0	139.0
Latvia	176.1	118.2	165.5
Lithuania	135.4	67.4	123.2
Luxembourg	115.2		114.5
Hungary	144.6	107.1	138.0
Malta	126.3		124.7
Netherlands	111.7	*96.7*	111.4
Austria	121.7	*62.8*	117.4
Poland	149.5	106.7	146.7
Portugal	150.9	93.2	144.8
Slovenia	135.5	82.4	130.6
Slovakia	140.9	104.7	137.8
Finland	128.8	*68.9*	125.4
UK	131.5	77.2	126.4
EU	132.5	87.2	128.3

Note: Blanks indicate no data or unreliable data because of insufficient number of observations. Figures in italics indicate data of uncertain reliability because of small number of observations.
Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

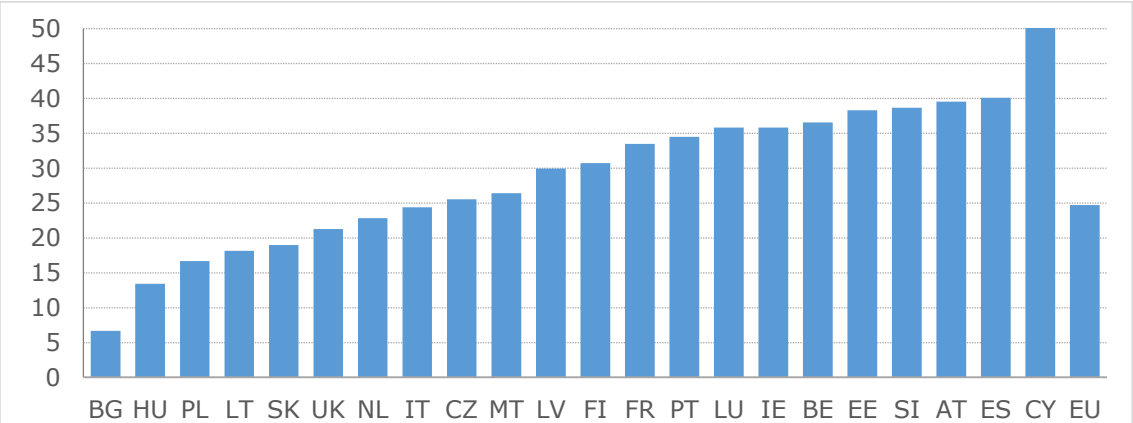
A further point to note is that the average income of those who became deprived was lower than the median in all EU15 countries, whereas in many of the EU13 countries, it was above the median. This reflects the much higher level of median income in most of the former than the latter. Accordingly, in the EU13, many of the materially deprived have above average income, whereas in most of the EU15, few of those with income above the median are recorded as being deprived. In Bulgaria, therefore – where 63% of people in the households covered were materially deprived in 2011 – those becoming deprived had an average level of income which was 37% above the median in 2011 and in Latvia (where 43% were deprived), 18% above.

The effect of an increase in income

An increase in income on the same scale, as would be expected, has the effect of enabling a significant number of people to escape material deprivation in most countries. Some 25% of those in the EU who were materially deprived in 2011 and experienced an increase in income of 10% or more between 2011 and 2012 were, therefore, not deprived in 2012 (Figure 2). The proportion, however, varied equally widely between countries, ranging from under 20% in Hungary, Poland, Lithuania and Slovakia and under 10% in Bulgaria to close to 40% in Spain and Austria and 50% in Cyprus. In 14 of the 22 countries for which there are reasonably reliable data (i.e. excluding Denmark[16]), the proportion becoming non-deprived was over 25%.

In this case, there is less of a relationship between the size of the reduction in the relative number of people becoming non-deprived and country income levels. While most of the countries showing the smallest reduction were low-income ones with relatively high rates of material deprivation, those showing a relatively large reduction were not all high-income ones, though they are countries in which the rate of material deprivation was below the EU average. (This is true of Estonia and Slovenia as well as Spain despite their average household income also being below the EU average; average household income in Cyprus is well above the EU average, though so is the material deprivation rate.)

Figure 2 Proportion of those who were materially deprived in 2011 and who experienced an increase in income of 10% or more in 2011-2012 who became non-deprived in 2012 (%)



Note: DK, number of observations too small to be reliable.
Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

Again it can be expected that the initial level of income is an important factor, in that those with a relatively high level of initial income are likely to stand more of a chance of escaping material deprivation than those with a relatively low level after an increase in income, in

[16] Note that in the EU-SILC, the number of observations need to be above 20 for the data to be regarded as reasonably reliable. If the number is over 20 but less than 50, then it is considered to be reasonably reliable but with a relatively wide margin of error.

part because they are likely to be initially deprived of fewer items. This is supported by the evidence.

Across the EU as a whole, therefore, the average income of those escaping deprivation was some 13% higher in 2011 than for those who failed to escape despite experiencing a similar increase in income. In all countries for which there are data, apart from Ireland and Italy, the average income of the first group was higher than that of the second, in most cases, significantly so (Table 4). As in the case of those becoming deprived after a loss of income, the relative level of income of those becoming non-deprived tends to be higher in the EU13 countries than the EU15 ones, again reflecting the generally higher income levels of the materially-deprived relative to the average in these countries.

It is also the case that the number of years during which households have experienced material deprivation is also likely to be important, in the sense that the more years this is, the more difficult it is likely to be for households to escape from deprivation because of the erosion of savings and, possibly, assets. Persistent material deprivation tends to be proportionally higher in countries where the rate of deprivation is highest. In Bulgaria, therefore, over 90% of those who were deprived in 2013 were persistently deprived, in the sense of being deprived for at least two of the preceding three years, and in Poland, over 80%, whereas in the Netherlands, it was only around half and in Luxembourg, a third[17]. Nevertheless, this relationship is by no means uniform across countries, so that countries with similar levels of material deprivation in a number of cases have different levels of persistent deprivation. For example, in Cyprus and Latvia, the rate of material deprivation is much the same (around 39% in 2013), but the rate of persistent deprivation is much lower in the first (20% in 2013) than the second (31%), which might be part of the explanation of the higher rate of exit from deprivation in the first than the second. The same applies to Spain and the Czech Republic (persistent deprivation in the former being only 60% of the latter despite the rate of deprivation being similar).

On average, the increase in income between 2011 and 2012 of those who escaped deprivation was around 53%. This gives an indication of the scale of the increase in income that the households which were materially deprived in 2011 would need to move out of material deprivation. On the assumption that the average characteristics of those who were deprived in 2011 but who did not experience an increase in income of 10% or more were the same as those that did, especially in terms of their initial level of income, the implication is that if everyone who was deprived in 2011 had experienced a rise of income of 53%, the number of materially deprived overall in the EU would have been reduced by a quarter (instead of by just over 7%). In other words, the rate of material deprivation in the EU could be reduced by 25% if the households concerned were given a transfer equivalent to just over 50% of their present income.

The size of the increase, however, varies markedly across countries. In Austria, Cyprus and Luxembourg, it is only around 25% or less, whereas in Hungary, it is over 75% and in Bulgaria, close to 250%.

[17] See the Social Situation Monitor, Research Findings, persistent material deprivation: http://ec.europa.eu/social/main.jsp?catId=1050&intPageId=1997&langId=en

Table 4 Household disposable income in 2011 relative to the median of those who became non-deprived and those who did not among those who were deprived and experienced an increase of 10% or more in income, 2011-2012 (Median=100)

	Became non-deprived	Remained deprived	Total
Belgium	70.4	59.4	63.4
Bulgaria	133.4	73.0	77.0
Czech Republic	73.9	58.4	62.3
Estonia	111.5	60.7	80.2
Ireland	*70.2*	76.6	74.3
Spain	67.4	51.5	57.9
France	70.5	59.8	63.4
Italy	57.4	64.3	62.6
Cyprus	85.4	74.1	79.8
Latvia	99.5	75.2	82.5
Lithuania	96.6	61.9	68.2
Luxembourg	*61.3*	*56.4*	58.1
Hungary	85.9	69.4	71.6
Malta	*73.5*	66.1	68.1
Austria	66.2	59.7	62.3
Poland	88.3	70.3	73.3
Portugal	87.5	73.6	78.4
Slovenia	80.4	61.7	68.9
Slovakia	85.7	68.0	71.4
Finland	61.6	57.6	58.9
UK	67.4	67.0	67.1
EU	73.7	65.4	67.5

Note: DK and NL: number of observations too small for data to be to be reliable. Figures in italics indicate data of uncertain reliability because of small number of observations.
Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

The effect of changes in income on material deprivation status in the longer term

It is plausible to suppose that a reduction in real income on a significant scale might not lead to a household becoming materially deprived, as measured, immediately since it may be able to fall back on its savings for a time and maintain its expenditure on essential items, such as on regular meals or keeping the house warm. The longer the reduction in income goes on, the more difficult this is likely to be.[18] The concern here, therefore, is to examine the effect on material deprivation of a reduction in income in the preceding year.

The concern is also to examine the related issue of the extent to which a significant increase in real income leads to households which are deprived becoming non-deprived over the longer term. In the same way as in the case of a reduction in income, it is plausible to expect households to need time to adjust to an increase in income, to feel that they are able to afford the particular items included in the deprivation indicator only after the increase proves to be other than temporary.

Households experiencing a reduction in income

To begin with the households experiencing a reduction in income, the focus is again on those which were not materially deprived in 2011 but whose income declined in real terms by 10% or more in 2010-2011 and for whom it remained at least 10% below the 2010

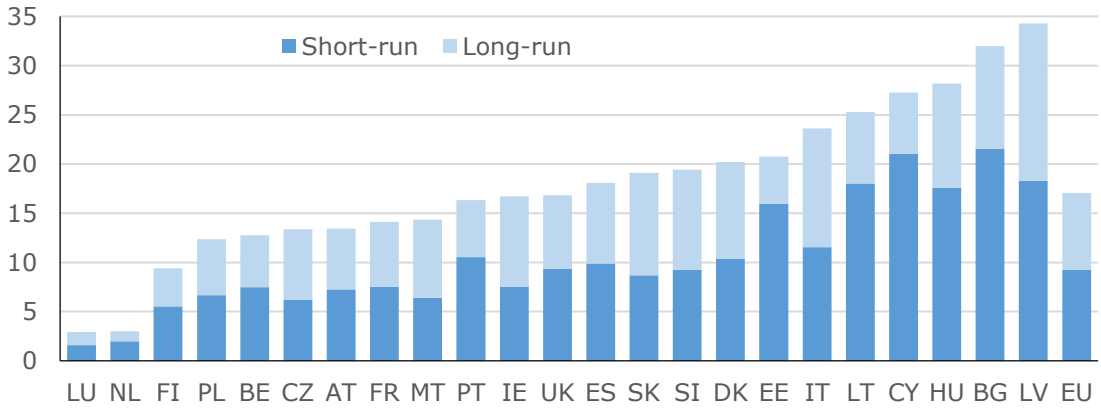
[18] The Commission Working Paper on the dynamics of poverty, *op cit*, found equally that the longer the spell with income below the at-risk-of-poverty, the more likely it was that people would remain materially deprived.

level in 2012 (i.e. there was no recovery in their income). The further condition is imposed that they did not experience a similarly large reduction in income in 2011-2012 since they would have then been picked up by the above analysis. The question to investigate is how many of these became deprived in 2012 – i.e. one year after experiencing a significant reduction in income.

In the 23 Member States for which the relevant data are available, around 8% of those whose real disposable income fell by 10% or more in 2010-2011 and who were not deprived in 2011 became deprived in 2012 (Figure 3). These can be added to those who became deprived after experiencing a reduction of income of 10% or more in 2011-2012 (as indicated in Figure 1 above). Accordingly, around 17% of those who were not materially deprived and whose income fell by 10% or more are estimated to have become deprived after a year or so[19]. In Lithuania, Cyprus and Hungary, the proportion was over 25% and in Bulgaria and Latvia, over 30%, all countries where a relatively large proportion were deprived, while at the other end of the scale, in Finland, Luxembourg and the Netherlands, countries where relatively few were deprived, it was less than 10%.

The proportion that became deprived in 2012 after their income declined by 10% or more between 2010 and 2011, i.e. in the longer-term, varied broadly in line with the proportion that became deprived in the short-term. It was largest in Latvia, Italy and Hungary, which were among the 6 countries in which the short-term proportion was largest, and smallest in the Netherlands, Luxembourg and Finland, which were the three countries with the smallest proportion becoming deprived in the short-term.

Figure 3 Proportion of those not deprived in 2011 whose disposable income fell by 10% or more in real terms in 2011-2012 (short-term) and in 2010-2011 (long-term) who became deprived in 2012 (%)



Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

Nevertheless, the relative sizes of the short-term and longer-term effects varied across Member States. Whereas overall and in most countries, the proportion becoming deprived after a year or so was smaller than that becoming deprived soon after the reduction in income, the reverse was the case in the Czech Republic, Malta, Ireland, Slovakia and Slovenia, while it was much the same in Denmark and Italy. (In Ireland, however, the period between the reduction in income and the survey on which the indicator of material deprivation is based is shorter on average than in other countries because income is reported for the 12 months preceding the survey instead of for the preceding calendar year.)

[19] As noted above, this is very much an estimate which attempts to overcome the limitations of the data being used. Ideally, the analysis should be conducted over a longer period, in this case 2010-2013, which is 4 years rather than the three years examined here. Those not materially deprived in 2010 (i.e. according to the 2010 survey) could then have been tracked up to 2012 along with the change in their income over the same period (which, as here, requires data from the 2013 survey). This is possible to do from the longitudinal data but only if the sample size is reduced by half (from 50% of those surveyed in 2013 to 25%), with consequent implications for the reliability of the analysis. The choice made here was to have a larger sample size and to estimate the short and long-term effects of a change in income in the way in which it has been done.

Conversely, the size of the longer-term effect relative to the short-term was comparatively small in Cyprus and Estonia, where over 75% of those becoming deprived after a significant fall in income did so soon after the fall occurred, and to a lesser extent in Lithuania (where this was the case for 71%). In sum, therefore, there is a marked variation across countries in the length of the lag between a decline in income and its effect on deprivation, which may reflect in part the differing ability of the households concerned to fall back on their savings, as well as the number of items which they are initially deprived of (which is examined below).

As would be expected the scale of the fall in real income between 2010 and 2011 tended to be larger among those who became deprived than among those who did not. In the 23 countries taken together, the decline was almost 6 percentage points larger for the former group than the latter (Table 5). Apart from Belgium and Lithuania, in both of which the comparison is of uncertain reliability because of the small number of observations, the decline was also larger for those becoming deprived in all Member States.

As in the case of the short-term relationship, the initial level of income of those becoming deprived is also lower than for those remaining non-deprived. Across the 23 countries as a whole, it was around 50% lower, on average, and in all Member States, it was substantially below the average of those remaining non-deprived. In all EU15 countries- apart from Ireland and Portugal, the average level of initial income in 2010 of those becoming deprived was below the median, in most cases, well below, while there were 8 EU13 countries where it was above the median.

Table 5 Initial income relative to median (median=100) and change in real income in 2010-2011 of those becoming deprived in 2012 and those remaining non-deprived after a fall in income of 10% or more in 2010-2011

	Income in 2010 relative to median			% Change in income, 2010-2011	
	Not deprived in both years	Became deprived	Total	Not deprived in both years	Became deprived
BE	133.8	*56.8*	129.3	-20.5	*-19.0*
BG	213.5	135.7	201.8	-26.3	-30.2
CZ	145.4	102.4	141.0	-20.1	-27.4
DK	127.4		123.5	-16.0	
EE	167.8	*101.0*	163.7	-19.9	*-34.9*
IE	149.3	104.7	143.9	-20.9	-26.5
ES	135.7	75.4	128.4	-20.7	-33.8
FR	140.0	98.2	135.9	-19.3	-21.2
IT	132.8	96.8	127.6	-20.1	-24.5
CY	165.7	*148.5*	163.3	-17.3	*-28.2*
LV	187.8	136.8	177.6	-24.2	-29.9
LT	170.6	*94.8*	163.0	-24.5	*-19.5*
LU	118.3		117.5	-18.5	
HU	173.9	121.6	164.1	-18.9	-22.5
MT	129.8	*110.0*	127.6	-18.2	*-22.2*
NL	124.5		124.2	-16.9	
AT	112.7	*84.2*	110.1	-20.9	*-21.6*
PL	152.4	94.4	147.0	-18.8	-28.9
PT	166.8	118.1	162.1	-18.6	-22.3
SI	140.5	96.1	133.1	-16.6	-26.6
SK	141.4	111.7	137.1	-19.6	-22.8
FI	125.1	82.1	122.0	-16.8	-24.5
UK	161.3	*92.3*	154.2	-25.6	*-26.0*
EU	144.8	95.2	139.5	-20.1	-25.5

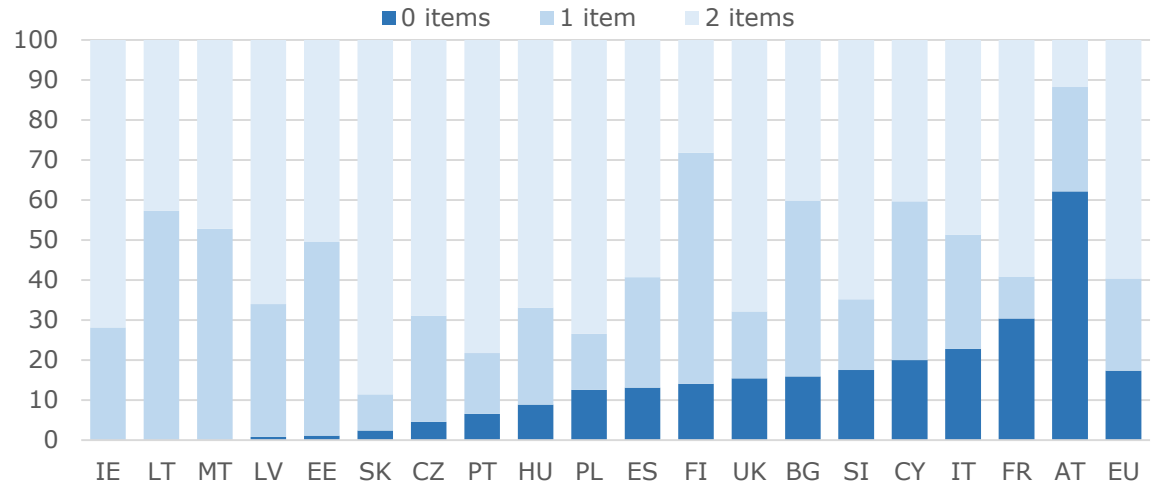
Note: Blanks indicate no data or unreliable data because of insufficient number of observations. Figures in italics indicate data of uncertain reliability because of small number of observations.
Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

The number of items households are deprived of

Just as the initial level of income affects the likelihood of an increase enabling households escape from deprivation, so too does the initial number of items that households are deprived of. On average in the EU, 60% of those who lost income and became deprived in 2012 were deprived of – in the sense of not being able to afford – two items of the 9 items on which the indicator of material deprivation is based (Figure 4). Accordingly, most of the people becoming deprived needed only to become unable to afford one item in order to be defined as materially deprived.

The extent to which this is the case, however, varied between Member States. In Finland, only 28% of those who became deprived were unable to afford two items and in Austria, just 12%, so that in these two countries, the great majority of those becoming deprived lost the ability to afford two or more items when their income declined – in Austria, three of more items in the case of most of them. On the other hand, in Portugal, 80% of the people concerned were already unable to afford two items in 2011 before their income fell and in Slovakia, 90%.

Figure 4 Number of items those experiencing a fall in income of 10% or more in 2010-2011 and becoming deprived in 2012 were deprived of in 2011

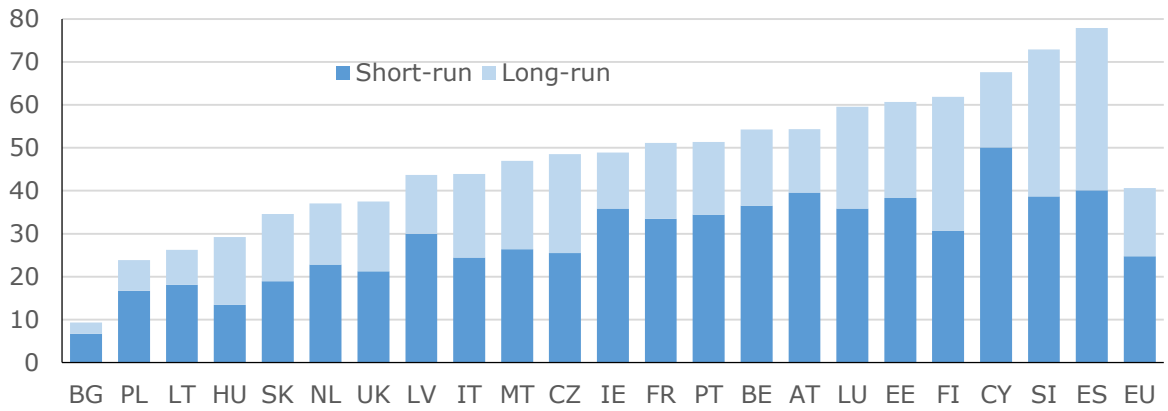


Note: Data unrelaible for BE, DK, LU and NL; data relative uncertain for LT, MT, FI and UK
Source: Eurostat, EU-SILC, 2013, longitudinal data, authors' calculations

Households experiencing an increase in income

On average, across the 23 countries, 16% of those who were materially deprived in 2011 and who experienced an increase in income of 10% or more in 2010-2011 had become non-deprived by 2012 in addition to the 25% who had become non-deprived soon after the rise in income (Figure 5). Accordingly, some 41% of those experiencing an increase in income of this size had moved from being deprived to non-deprived after a year or so. In Spain, the proportion was close to 80% and in Slovenia, over 70%, while in Poland and Lithuania, it was around 25% and in Bulgaria, only under 10%. Apart from these three countries and Hungary, Slovakia, the Netherlands and the UK, the proportion becoming non-deprived was over 40% in all countries.

Figure 5 Proportion of those deprived in 2011 whose disposable income rose by 10% or more in real terms in 2011-2012 (short-term) and in 2010-2011 (long-term) who became non-deprived in 2012 (%)



Note: Data for DK unreliable. Data for IE, LU and NL, uncertain reliability
Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

The proportion becoming non-deprived only after a year or so of their income increasing relative to those becoming non-deprived soon after the rise in income varies markedly across countries, and more so than in the case of the relative numbers becoming deprived after a fall in income. In Finland and Hungary, the longer-term response was slightly larger than the short-term one, while in Spain, Slovenia and the Czech Republic, it was only a little smaller. Conversely, in Bulgaria, Ireland, Austria and Cyprus, over 70% of the overall proportion becoming non-deprived moved out of deprivation soon after the rise in income.

Unlike in the case of a fall in income, there is only a limited tendency for the increase in income in 2010-2011 to be larger for those who became non-deprived than for those remaining deprived. The average increase in the countries for which there are data was only slightly larger for the former than for the latter and there are a number of countries (8 of the 21) in which the increase was smaller for those becoming non-deprived than for those remaining deprived (Table 6).

There is a fairly systematic tendency, however, for the initial level of income to be higher for those households which became non-deprived after experiencing an increase in income of 10% in 2010-2011. On average, the average level of income relative to the median in 2010 was 9 percentage points higher for the first group than the second and the first group had a higher income level than the second in all countries.

Accordingly, the initial level of income, as in the case of those becoming deprived after losing a significant part of their income, seems to be an important determinant of whether or not people escape material deprivation after a significant increase in income.

Table 6 Initial income relative to median (median=100) and change in real income in 2010-2011 of those becoming non-deprived in 2012 and those remaining deprived after a rise in income of 10% or more in 2010-2011

	Income in 2010 relative to median			% change in income, 2010-11	
	Remained deprived	Became non-deprived	Total	Remained deprived	Became non-deprived
BE	*41.6*	60.7	46.7	*53.7*	27.3
BG	*72.0*	113.9	74.8	*33.4*	76.3
CZ	65.9	86.4	72.0	24.5	26.2
EE	69.9	73.8	71.1	29.2	68.4
IE		94.3	75.3		23.5
ES	45.6	52.2	48.8	27.3	50.7
FR	55.5	62.5	57.8	36.1	32.1
IT	49.3	56.2	51.2	29.0	55.2
CY	61.3	85.4	69.2	23.7	24.3
LV	61.0	94.9	69.9	41.2	46.6
LT	67.8	84.8	71.3	38.6	20.7
HU	70.3	88.6	73.4	27.2	27.7
MT	64.4	81.7	69.9	23.6	16.8
NL		*65.2*	*59.3*		*19.4*
AT	*46.0*	*53.7*	47.8	*40.7*	*28.8*
PL	68.1	80.2	69.8	24.6	31.1
PT	55.7	65.9	58.8	28.1	23.2
SI	64.0	74.1	69.1	27.4	19.6
SK	72.0	92.5	76.9	24.5	28.9
FI	*55.7*	*70.8*	64.7	*17.2*	*27.7*
UK	*61.3*	78.3	65.5	*38.1*	28.5
EU	60.6	69.8	62.9	31.6	33.7

Note: No reliable data for DK and LU. Blanks indicate no data or unreliable data because of insufficient number of observations. Figures in italics indicate data of uncertain reliability because of small number of observations.

Source: Eurostat EU-SILC 2013 longitudinal data, authors' calculations

The relationship between a fall in income and an increase in material deprivation

The remainder of this section examines the relationship between a change in income – in this case a reduction – and the change in the material deprivation status of households in a more formal way through econometric analysis, specifically through a logit model. This relates whether a person becomes materially deprived or not after a reduction in real income of at least 10% to their initial level of income relative to the country median and to the extent of the decline in income in both the short and longer-term – i.e. in 2010-2011 and 2011-2012. The form of the equation estimated is, therefore:

$$MD_{2012}=a+b1Y/YM_{2010}+b2\Delta Y_{2010\text{-}2011}+b3\Delta Y_{2011\text{-}2012}$$

where MD is whether a person is materially deprived or not (taking a value of 1 and 0, respectively) in 2012, Y is household disposable income and YM is median household disposable income. The equation is estimated for each country separately since part of the aim is to identify differences in the relationship between countries.

The results show that in most countries the coefficients for the independent variables have the expected sign (the standard errors are shown in Annex Table A.1). They show that in all countries, except Luxembourg and Slovakia, there is a significant relationship – in most cases, highly significant – between becoming deprived and the initial level of income, i.e. the lower the level, the greater the chances of becoming materially deprived if income declines by 10% or more (Table 7).

Table 7 Logit estimates of the relationship between whether a person becomes materially deprived or not in 2012 and initial income relative to the median (=100) and the % change in income 2010-2011 and 2011-2012

	a (intercept)	b_1 (Y/YM)	b_2 ($\Delta Y_{2010-2011}$)	b_3($\Delta Y_{2011-2012}$)
BE	3.048*	-0.077***	-0.047*	-0.023
BG	-0.377	-0.018***	-0.058***	-0.033***
CZ	-1.228	-0.017***	-0.045*	0.006
EE	-0.534	-0.015***	-0.027*	-0.006*
IE	-1.009	-0.013***	-0.018	0.001
ES	-1.242***	-0.015***	-0.033***	0.000
FR	-2.880***	-0.011***	-0.067***	-0.012**
IT	-0.048	-0.018***	-0.014*	-0.016***
CY	-2.040***	-0.010***	-0.067***	-0.035***
LV	-0.150	-0.009***	-0.015	-0.012*
LT	4.364***	-0.050***	0.040	0.026*
LU	-3.237***	-0.021	-0.042	-0.005
HU	-0.931**	-0.016***	-0.073***	-0.011**
MT	-0.581	-0.014***	-0.010	-0.047***
NL	-4.396**	-0.013*	-0.052	-0.007
AT	-2.160**	-0.007*	-0.015	-0.001
PL	-1.325***	-0.018***	-0.039***	-0.005
PT	-2.270***	-0.011***	-0.061***	-0.016**
SI	-0.377	-0.019***	-0.029**	-0.001
SK	-0.944	-0.014	-0.034*	0.012
FI	-0.262	-0.039***	-0.045**	-0.004
UK	0.815	-0.026***	-0.013	-0.010
EU	-0.992***	-0.015***	-0.027***	0.000

*Note: Data for DK unreliable. Asterisks indicate degree of significance: ***p<0.001, ** p<0.01 , * p<0.05*
Source: Eurostat EU-SILC longitudinal microdata, authors' calculations.

The relationship with the change in income between 2010 and 2011 is also significant in most countries (14 of the 22), in the sense that the more income declined beyond a reduction of 10%, the more people became materially deprived. There is a less widespread relationship, however, between becoming deprived and the extent of the reduction in income between 2011 and 2012. The relationship was significant in less than half the countries (9 of the 22), implying that the longer-term effect outweighed the short-term one in most countries. Only in Malta and, to a lesser extent, in Italy does the short-term effect seem more important in terms of both the significance and its scale. In 5 countries, however (Ireland, Luxembourg, the Netherlands, Austria and the UK), the extent of the reduction in income over both periods has an insignificant effect on whether someone becomes materially deprived or not.

It is also instructive to examine the odd ratios to get an indication of the scale of the effect of the initial level of income and the size of the change in income on the chances of becoming materially deprived.

The results indicate that the odds ratio of the intercept in 9 of the countries, as well as in the 22 countries in which the data are reasonably reliable taken together, is statistically significant and much lower than 1 (Table 8).

Table 8 Odd ratios of the independent variables included in the logistic regression model for the relationship between whether a person becomes materially deprived or not in 2012 and initial income relative to the median (=100) and the % change in income in 2010-2011 and 2011-2012

	a (intercept)	b_1 (Y/YM)	b_2 ($\Delta Y_{2010-2011}$)	b_3($\Delta Y_{2011-2012}$)
BE	21.077*	0.926***	0.954*	0.977
BG	0.686	0.982***	0.943***	0.967***
CZ	0.293	0.983***	0.956*	1.006
EE	0.586	0.985***	0.974*	0.994*
IE	0.365	0.987***	0.982	1.001
ES	0.289***	0.985***	0.967***	1.000
FR	0.056***	0.989***	0.935***	0.988**
IT	0.953	0.983***	0.986*	0.985***
CY	0.130***	0.990***	0.935***	0.965***
LV	0.860	0.991***	0.985	0.988*
LT	78.543***	0.952***	1.040	1.027*
LU	0.039***	0.979	0.959	0.995
HU	0.394**	0.984***	0.930***	0.989**
MT	0.559	0.986***	0.990	0.954***
NL	0.012**	0.987*	0.949	0.993
AT	0.115**	0.993*	0.985	0.999
PL	0.266***	0.982***	0.962***	0.995
PT	0.103***	0.989***	0.941***	0.984**
SI	0.686	0.981***	0.971**	0.999
SK	0.389	0.986	0.966*	1.012
FI	0.769	0.961***	0.956**	0.996
UK	2.259	0.974***	0.988	0.990
EU	0.371***	0.985***	0.974***	1.000

*Note: Data for DK unreliable. Asterisks indicate degree of significance: ***p<0.001, ** p<0.01 , * p<0.05*
Source: Eurostat EU-SILC longitudinal microdata, authors' calculations.

This indicates that in these countries, the individuals in the reference group in the logistic regression models (i.e. those who were not materially deprived and experienced a reduction of at least 10% in household income and whose household income was equal to median income in the country at the beginning of the period) were not likely to become materially deprived even after a reduction in their income of this size. On the other hand, in Belgium and Lithuania, the odd ratio of the intercept is statistically significant and in both cases is well above 1, implying that, in the two countries, a reduction in income of 10% or more is in itself a strong determinant of becoming deprived.

The initial level of household income relative to the median is significant in 20 of the 22 countries – i.e. in all except Luxembourg and Slovakia. In Belgium, there is an increase of 7.5% in the odds of becoming materially deprived at the end of the period associated with each 1 percentage point reduction in the ratio of household income to the median. In Lithuania, the increase is slightly below 5% and in Finland, around 4%. On the other hand, the increase in the odds ratio from such a reduction is less than 1% in Latvia and Austria.

The largest effect of the change in income between 2010 and 2011 is in Hungary, where the odds of someone becoming deprived is increased by 7% for each 1% fall in household income. The increase in France and Cyprus is 6.5% and in Portugal and Bulgaria, just under 6%, while in Estonia, Slovenia, Spain, Slovakia, Poland, Finland, the Czech Republic and Belgium, it varied between 2.5% and 4.5%, though in Italy, it is less than 1.5%.

The further implication of the regression results is that a larger decline in income between 2011 and 2012, or a smaller increase, also raised the odds of becoming materially deprived of those who experienced a loss of household income of at least 10% in the previous year, 2010-2011. In Malta, each additional 1% reduction in income increased the odds of

becoming deprived by 4.5%, in Bulgaria and Cyprus, by just over 3%, in Portugal, Italy, Latvia, France and Hungary, by 1-1.5%; and in Estonia by just under 1%.

It is, nevertheless, the case that only a relatively small part of the increase in material deprivation between 2011 and 2012 is explained by the initial level of income and the reduction in income in the two years 2010-2012 (see Annex Table A.1). Other factors, therefore, in combination tend to be more important.

The effect of a reduction in income on the affordability of the items included in the material deprivation indicator

The further concern is to examine the effect of a significant decline in household income on the ability to afford the individual items which make up the material deprivation indicator. This is intended to provide an insight into which of the items concerned are most likely to become non-affordable with a relatively large loss of income and which, therefore, play a major role in determining households becoming materially deprived. By the same token, it should give an indication of the items which households tend to give up first when their income declines. This, accordingly, effectively represents a re-examination of the findings of the Guio-Pomati analysis, which were, as noted at the outset, that households tended to do without items in a certain order as their income falls, starting with holidays, as well as becoming unable to meet unexpected expenses.

To examine this, the focus is again on those whose household disposable income in real terms fell by 10% or more in 2010-2011 or in 2011-2012 (i.e. taking account of both the short-term and longer-term effect), with the further condition that they reported being able to afford the item in question in 2011. Each of the items is then examined in turn to see how many people who initially were able to afford the item, reported not being able to do so one year later in 2012 (or more precisely, how many people lived in the households which reported not being able to afford the item concerned).

In practice, two of the items in particular stand out as being those which the largest proportion of people in households experiencing a substantial reduction in income report being unable to afford. One is being able to meet unexpected expenses should they arise; the other is being able to go away for one week's annual holiday – i.e. the same items as identified by Guio and Pomati as being the first to become no longer affordable). In both cases, some 31% of the people in the countries covered whose income had declined reported that they were no longer able to afford them (Table 9). And although the relative numbers so reporting for each item varied between Member States, in each case, they were either the item which the largest proportion of people were unable to afford or the second largest. (In 11 of the 23 countries, the inability to meet unexpected expenses was reported by the largest number and in the other 12, it was reported by the second largest number; in these 12, the inability to afford a holiday was reported by the largest number and in the other 11, not being able to meet unexpected expenses was the second most frequently reported item.) In 6 countries, over 40% of the people losing income reported not being able to afford one or other of them, and in three countries – Italy, Cyprus and Latvia – both. Equally, there were only 6 countries in which the proportion reporting an inability to afford either of them was less than a quarter.

Being able to keep the house warm was the third most commonly reported item that people losing income were unable to afford, though the overall number reporting this was less than half of that reporting either of the first two items. Perhaps surprisingly, the largest proportion of people reporting this was in Cyprus, while, more as might be expected, the smallest proportion was in Malta. In the latter and 9 other countries, the proportion was less than 10%.

Being in arrears in paying the rent, mortgage or utility bills was reported by virtually the same number of people across the EU, with the proportion exceeding 30% in Slovenia and Cyprus. In this case, the proportion reporting was less than 10% in only 6 countries, while the proportion was either the third or fourth largest in 16 of the 23 countries. Since the latter was the case in only 12 in respect of keeping the house warm, this suggests that

falling into arrears was a more prevalent consequence of a reduction in income than failing to keep the house warm.

Being unable to afford a decent meal at least every other day was reported by the fifth largest proportion of people (10% across the 23 countries), though in all but 6 countries, the proportion was less than 15%, suggesting that most people whose income declined were more prepared to give up other things, such as an annual holiday, rather than do without a regular decent meal. In Hungary, however, the proportion was close to 30% and in Bulgaria, around 35%, in both cases more than the proportion reporting being unable to afford to keep the house warm or falling into arrears in paying bills.

Table 9 Proportion of those whose real income fell by 10% or more in 2010-2011 or in 2011-2012 reporting a new inability to afford particular items in 2012

	Unexpected expenses		Holiday		Warm house		Arrears		Regular meal		Car	
	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
LU	20.9	1	13.9	2	1.1	6	2.2	4	3.4	3	1.5	5
NL	14.5	1	11.9	2	11.2	3	7.3	4	1.9	6	4.0	5
FI	16.5	1	12.1	2	3.8	6	10.5	3	4.0	5	4.4	4
PL	31.3	1	27.1	2	6.9	5	13.2	3	7.7	4	6.3	6
BE	18.2	2	18.4	1	11.4	3	8.4	4	6.0	5	3.7	6
CZ	29.2	2	30.1	1	5.3	4	3.9	6	14.4	3	4.5	5
AT	20.1	1	18.0	2	7.4	6	10.9	5	11.8	3	11.2	4
FR	25.2	1	20.6	2	9.3	5	11.9	3	10.5	4	4.3	6
MT	18.0	2	38.2	1	1.0	6	10.3	4	12.7	3	2.2	5
PT	34.6	2	51.7	1	22.0	3	7.2	4	4.8	6	5.7	5
IE	31.5	2	32.0	1	10.0	4	20.7	3	5.0	5	2.8	6
UK	31.4	1	26.9	2	16.8	3	15.3	4	9.8	5	8.7	6
ES	34.6	2	41.1	1	14.2	3	13.5	4	3.3	6	5.2	5
SK	32.6	2	39.2	1	9.9	5	9.1	6	15.5	3	11.5	4
SI	40.0	1	24.5	2	11.0	5	31.9	3	14.8	4	3.9	6
DK	32.1	1	29.1	2	5.7	5	12.1	4			16.2	3
EE	33.2	2	40.8	1	6.5	6	14.5	3	12.2	4	11.9	5
IT	41.0	2	49.2	1	23.0	3	14.1	5	17.4	4	1.1	6
LT	55.0	2	31.8	1	24.6	3	15.0	5	15.9	4	10.7	6
CY	41.9	2	66.3	1	27.6	4	33.5	3	9.2	5	0.6	6
HU	43.6	1	30.0	2	11.7	6	17.5	4	28.6	3	14.5	5
BG	54.0	1	38.3	2	25.9	4	25.3	5	35.2	3	7.1	6
LV	48.6	2	54.1	1	23.6	3	19.8	6	23.0	4	19.9	5
EU	31.5		31.1		13.5		13.4		10.0		5.6	

Note: 'Rank' indicates the rank order of the item among those included in the material deprivation indicator in terms of the proportion of people who report not being able to afford it after their income has fallen.

Source: Eurostat, EU-SILC, longitudinal data; authors' calculations

Being unable to afford a car was reported by the sixth largest proportion of people, though this meant by only just over 5% of those losing a significant part of their income. In all but 7 Member States, the proportion was less than 10% and in 11 countries, less than 5%. Only in Denmark, perhaps surprisingly (where it was reported by the third largest number of people), and Latvia, was the proportion over 15%.

The other three items, a telephone, a washing-machine and a colour TV were reported as being unaffordable but only a very small number of people, in each case, much less than 1% in the 23 countries taken together and, with very few exceptions, less than 2% in all Member States[20]. Each of these, therefore, plays only a very minor role in households

[20] The exceptions are Latvia, Finland and Denmark in respect of being unable to afford a washing machine, which was reported by just over 2% of people in the first two countries, but by over 8% in Denmark, which raises

becoming materially deprived and their exclusion from the 9 items which make up the indicator would make very little difference to the proportion of households being measured as being materially deprived. The fact that very few people reported these items as being unaffordable might well reflect the types of item that they are, namely durable goods which households tend to purchase only infrequently. Accordingly, since almost all households have them, the question of their affordability is redundant as it is asked only if a household does not possess the item in question. (It would perhaps be more relevant to ask whether a household could afford to replace the item concerned, which is arguably a more reliable indicator of its affordability than its possession.)

In terms of the indicator, although not being able to meet unexpected expenses and being unable to afford a holiday are the two most common items reported following a decline in income, an inability to keep the house warm and falling behind on paying bills are the items which seem likely to tip a household into becoming materially deprived, since these are most frequently the third item which becomes unaffordable.

The above analysis suggests that the order in which items become unaffordable is relatively similar across countries, in the sense that meeting unexpected expenses and an annual holiday are the items which the largest proportion of people report being unable to afford in all countries after a decline in income, while becoming unable to afford a car is a relatively infrequent occurrence in most countries. This is in line with the findings of Guio and Pomati who adopted a slightly different methodology (specifically, the Deprivation Sequence methodology developed by Deutsch and Silber (2008), but who tested the results of applying this to the EU-SILC cross-sectional data by analysing the longitudinal data, much as has been done here).

The further issue which is of interest is the extent to which the individual items become non-affordable in the short-term – i.e. soon after a reduction in income – as opposed to the longer-term and vice versa, which provides an insight into which items households regard as most important to maintain their expenditure on. In practice, a relatively large proportion (47%) of those reporting an inability to afford unexpected expenses in the 23 Member States did so only after a year or so of their income falling (Table 10). Moreover, in 8 of the countries, the proportion concerned was larger than those reporting an inability to do so in the short-term. This was especially so in Ireland, Malta and Slovakia (though in the first of these, the effective lag is less than in other countries, as noted above).

By contrast, a significantly larger proportion of those reporting not being able to avoid falling into arrears in paying essential bills did so soon after the fall in income occurred and only in Finland, did much of a majority postpone reporting this to be the case until a year or so after.

In general, however, for most items there is a marked variation across Member States in the relative scale of the short-run and longer run effects. For example, whereas over two-thirds of people reporting not being able to afford an annual holiday in the Netherlands, Estonia, Hungary and Spain did so soon after their income fell, in 6 other countries (France, Malta, Ireland, Denmark, Slovakia and Latvia), the majority of people reported this to be the case only after a year or so. Accordingly, it is difficult to generalise about the how quickly, or slowly, households in different countries are likely to report the non-affordability of particular items after a significant reduction in income.

a doubt over whether the question was correctly put in terms of affordability rather than simply non-possession.

Table 10 Proportion of those whose real income fell by 10% or more in 2010-2011 reporting a new inability to afford particular items in 2012

	Unexpected expenses			Holiday			Warm house			Arrears			Regular meal			Car		
	s-r	l-r	s-r %	s-r	l-r	s-r %	s-r	l-r	s-r %	s-r	l-r	s-r %	s-r	l-r	s-r %	s-r	l-r	s-r %
LU	11.5	9.4	55.1	8.1	5.8	58.1	0.4	0.7	33.3	2.1	0.0	97.8	1.2	2.2	35.6	0.6	0.9	41.2
NL	8.3	6.2	56.9	8.8	3.1	74.0	4.3	7.0	38.0	6.8	0.5	92.6	1.5	0.4	77.6	3.5	0.5	86.6
FI	6.8	9.7	41.4	5.0	7.1	41.4	2.5	1.3	66.2	3.9	6.6	37.1	1.9	2.1	47.1	2.6	1.8	59.8
PL	18.2	13.1	58.0	14.4	12.7	53.1	4.5	2.4	65.8	8.1	5.1	61.2	3.8	3.9	49.1	4.1	2.2	64.6
BE	8.0	10.2	43.8	10.8	7.6	58.8	7.2	4.2	63.1	7.1	1.2	85.1	3.4	2.7	55.4	2.9	0.7	79.9
CZ	16.4	12.9	56.0	19.4	10.7	64.6	3.6	1.7	68.0	2.6	1.3	65.6	5.9	8.5	41.2	2.7	1.8	60.7
AT	9.0	11.1	44.8	10.7	7.3	59.3	5.8	1.7	77.7	6.5	4.3	60.2	5.8	6.0	49.0	7.4	3.8	65.7
FR	11.2	14.0	44.5	10.0	10.7	48.2	6.0	3.3	64.9	7.2	4.8	59.9	6.4	4.1	60.6	2.0	2.4	45.8
MT	5.6	12.4	31.1	16.4	21.7	43.0	0.3	0.6	35.9	5.7	4.6	55.3	7.1	5.6	56.0	2.2	0.0	100.0
PT	18.3	16.3	52.8	30.1	21.5	58.3	13.7	8.3	62.4	4.0	3.1	56.4	3.8	1.0	78.8	3.9	1.8	68.8
IE	11.8	19.6	37.7	14.5	17.5	45.4	6.6	3.3	66.8	10.2	10.6	49.1	2.4	2.5	49.4	2.7	0.2	94.1
UK	14.4	17.1	45.8	14.5	12.4	53.9	6.0	10.7	35.9	10.3	5.0	67.1	4.7	5.1	48.1	4.1	4.7	46.5
ES	22.4	12.2	64.8	27.4	13.7	66.8	6.9	7.3	48.7	8.0	5.6	58.7	2.0	1.4	59.3	3.3	1.9	62.9
SK	13.6	19.0	41.8	18.2	21.0	46.5	5.3	4.6	53.2	5.2	3.9	57.0	8.0	7.6	51.3	6.6	4.8	57.9
SI	20.5	19.5	51.2	13.0	11.5	53.0	4.6	6.4	41.7	17.0	14.9	53.3	6.2	8.6	42.0	2.2	1.8	54.9
DK	17.8	14.3	55.4	12.5	16.6	43.1	5.7	0.0	100.0	8.1	4.0	67.0				10.3	5.9	63.4
EE	19.0	14.2	57.3	29.7	11.0	73.0	5.1	1.4	78.0	8.4	6.1	58.1	7.0	5.2	57.6	7.5	4.4	63.3
IT	21.5	19.6	52.3	28.2	21.0	57.4	13.1	9.9	56.9	7.0	7.1	49.8	10.5	6.9	60.2	0.7	0.4	65.3
LT	38.1	16.9	69.3	16.7	15.1	52.4	16.9	7.7	68.5	10.7	4.3	71.4	12.4	3.4	78.5	8.6	2.1	80.2
CY	25.1	16.9	59.8	40.7	25.6	61.4	17.6	10.0	63.6	20.5	13.0	61.3	6.2	2.9	67.9	0.4	0.3	59.7
HU	24.5	19.0	56.4	21.0	9.0	70.1	8.1	3.6	69.6	12.7	4.8	72.5	17.8	10.8	62.1	9.1	5.4	62.9
BG	34.8	19.2	64.4	22.3	16.1	58.0	17.0	8.9	65.8	17.8	7.5	70.5	25.4	9.8	72.1	6.9	0.2	97.8
LV	30.3	18.2	62.4	26.5	27.6	49.0	15.5	8.1	65.7	10.1	9.7	51.1	11.8	11.2	51.4	10.7	9.2	53.6
EU	16.6	14.9	52.7	17.6	13.5	56.6	7.3	6.3	53.6	8.2	5.2	61.2	5.7	4.2	57.6	3.4	2.2	60.7

Note: s-r=short-run (i.e. in relation to a reduction of income of 10% or more in 2011-2012); l-r=longer-run (i.e. in relation to a reduction of income of 10% or more in 2010-2011); 's-r %' is those becoming deprived in the short-run as a % of the total becoming deprived in the short and longer-run.

Source: Eurostat, EU-SILC 2013 longitudinal data and authors' calculations.

Concluding remarks

The above shows, as expected, that there is a clear relationship between experiencing a reduction in income on a significant scale and the likelihood of becoming materially deprived, though this applies, in particular, at least in the higher income countries, to those whose income is already below the median. In some of the lower income countries, however, it applies to those with income above the median. Nevertheless, it is still the case that even in the lower income countries the great majority of the people living in households whose income declines will not become materially deprived – at least within a year or two - unless their income is below the median initially. At the same time, there are 5 countries, Bulgaria, Lithuania, Latvia, Hungary and Cyprus where a reduction in real income of 10% or more was associated with over a quarter of households which were not previously deprived becoming so between 2011 and 2012.

Just as reduction in income leads to some rise in material deprivation, so too does a significant increase in income give rise to a decline in the risk of deprivation, either immediately or after a year or two. In the majority of the Member States, for which data are available, around half of more of those living in households which were deprived became non-deprived after such an increase in their income. These include Cyprus and Latvia where the relative number of people deprived was well above average.

The analysis also shows that the time scale over which a change in income affects whether a household is materially deprived or not varies across countries. In some countries, Malta, Slovenia and Slovakia, especially, more of the effect seems to take place after a year or so, while in others, in particular Cyrus, Estonia and Lithuania, the reverse is the case. Regression analysis, however, tends to suggest that in most countries, the longer-term effect is the strongest and confirm that the initial level of household income is important in explaining both entry into deprivation and exiting from it.

Finally, the effect of a significant reduction in income on the affordability of the individual items which make up the material deprivation indicator differs markedly between them. In all Member States, the ability to meet unexpected expenses and to go on an annual holiday away from home are the items which are reported to become non-affordable first (which is line with the Guio and Pomati study cited at the outset). The third item of the indicator which tips households into becoming deprived, however, varies between countries. In some it is being unable to keep the house warm, in others, it is not being able to afford paying bills and in yet others, being unable to afford a decent meal for the family every other day, the number of countries concerned being roughly equal in number in each case. In one country, Denmark, the third item is being unable to afford a car. Only a very small proportion of those losing income, however, reported this to be the case. An even smaller proportion reported being unable to afford a colour TV, telephone or washing-machine in any of the countries – only around 1% on average of those whose income was reduced in each cases, which raises a question-mark over the relevance of their inclusion in the material deprivation indicator. (Indeed, the present proposal is that these items should be dropped from the indicator of material deprivation when it is revised and, accordingly, information on them should no longer be collected in the EU-SILC survey.

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Annexes

Annex A: The Alternative Measure of Material Deprivation

A household is materially deprived if it:

1. lacks the capacity to face unexpected expenses,
2. lacks the capacity to have a one-week holiday away from home,
3. lacks the capacity to afford a meal with meat, chicken and fish every second day,
4. lacks the ability to keep the house adequately warm,
5. has arrears on mortgage, rent, utility bills, hire purchase instalments or loans,
6. does not have a car, because it cannot afford it
7. does not have a computer and internet because it cannot afford it
8. does not have the capacity to replace worn-out furniture.

At least half of the adults (persons aged 16 or over) …

9. does not have the capacity to replace worn-out clothes by some new (not second-hand) ones
10. does have two pairs of properly fitting shoes (including a pair of all-weather shoes) because cannot afford it
11. cannot afford to spend a small amount of money each week on oneself
12. cannot regularly participate in a leisure activity such as sport, cinema, concert because cannot afford it
13. cannot get together with friends/family (relatives) for a drink/meal at least once a month because cannot afford it.

Individuals living in households lacking at least five items are considered *deprived*, while those in households lacking at least seven, are *severely deprived*.

This new definition has been proposed by Guio, Gordon and Marlier (2012).

Annex B: Correlation Matrix

	MD4	Income	Poverty gap	SocTran	Health	Educ	Pensions
Material deprivation rates	1.000						
Disposable income (log)	-0.825	1.000					
Poverty gap	0.670	-0.630	1.000				
Social transfers (log)	-0.764	0.919	-0.711	1.000			
Healthcare expenditures	-0.612	0.595	-0.433	0.543	1.000		
Education expenditures	-0.342	0.316	-0.361	0.414	0.238	1.000	
Pensions	-0.269	0.393	-0.100	0.253	0.603	0.260	1.000
Unemployment benefit	-0.413	0.537	-0.292	0.516	0.501	0.189	0.322
Family benefit	-0.319	0.527	-0.504	0.659	0.222	0.004	0.063
Share of low educated (% of pop)	-0.022	0.115	0.152	-0.062	-0.126	-0.057	-0.002
Employment rate	-0.511	0.534	-0.403	0.497	0.381	0.477	0.227
Share of large households (% of pop)	0.320	-0.319	-0.003	-0.176	-0.536	0.105	-0.562
Share of young people (% of pop)	0.174	-0.410	-0.008	-0.278	-0.453	0.060	-0.514
Share of urban households (% of pop)	-0.125	0.279	-0.054	0.232	0.111	-0.098	0.221
Savings rate	-0.233	0.295	-0.198	0.101	-0.008	-0.119	-0.171
Stock of vehicles (log)	-0.151	0.182	0.124	0.033	0.469	-0.218	0.628
Participation in tourism (log)	0.005	-0.086	0.090	-0.198	0.268	-0.077	0.416

	Unemp	Family	Low educ.	Emp. Rate	Large h-holds	Young	Urban
Unemployment benefit	1.000						
Family benefit	0.306	1.000					
Share of low educated (% of pop)	0.213	-0.099	1.000				
Employment rate	0.178	0.160	-0.295	1.000			
Share of large households (% of pop)	-0.251	-0.017	-0.048	-0.193	1.000		
Share of young people (% of pop)	-0.436	-0.174	-0.121	-0.284	0.741	1.000	
Share of urban households (% of pop)	0.156	0.337	0.257	-0.174	-0.269	-0.218	1.000
Savings rate	0.054	0.077	0.372	0.194	0.126	-0.022	0.197
Stock of vehicles (log)	0.324	-0.087	-0.103	0.065	-0.508	-0.517	0.255
Participation in tourism (log)	0.074	-0.376	-0.002	-0.044	-0.199	-0.092	-0.067

	Saving	Vehicles	Tourism
Savings rate	1.000		
Stock of vehicles (log)	0.025	1.000	
Participation in tourism (log)	0.218	0.605	1.000

Annex C: Multicollinearity Tests

Model 3. Income and Inequality
Tolerance = 0.31
VIF = 3.26
The VIF is lower than 10, so the model is acceptable.
Condition Number: 2.1
The condition number is lower than 30, so the model is acceptable.

Model 4. Welfare State
Tolerance = 0.28
VIF = 3.52
The VIF is lower than 10, so the model is acceptable.
Condition Number: 10.22
The condition number is lower than 30, so the model is acceptable.

Model 5. Society
Tolerance = 0.27
VIF = 3.71
The VIF is lower than 10, so the model is acceptable.
Condition Number: 3.64
The condition number is lower than 30, so the model is acceptable.

Model 6. All1
Tolerance = 0.26
VIF = 3.86
The VIF is lower than 10, so the model is acceptable.
Condition Number: 14.2
The condition number is lower than 30, so the model is acceptable.

Model 7. Subjective
Tolerance = 0.26
VIF = 3.88
The VIF is lower than 10, so the model is acceptable.
Condition Number: 2.81
The condition number is lower than 30, so the model is acceptable.

Model 8. All2
Tolerance = 0.19
VIF = 5.25
The VIF is lower than 10, so the model is acceptable.
Condition Number: 19.19
The condition number is lower than 30, so the model is acceptable.

Model 9. Final
Tolerance = 0.26
VIF = 3.86
The VIF is lower than 10, so the model is acceptable.
Condition number: 2.83
The condition number is lower than 30, so the model is acceptable.

Annex D Standard errors of the logit model

Table D.1 Standard errors for the logit estimates of the relationship between whether a person becomes materially deprived or not in 2012 and initial income relative to the median (=100) and the % change in income 2010-2011 and 2011-2012

	Independent variables				Pseudo R2 values		
	Intercept	b_1(Y/YM)	$b_2(\Delta Y_{2010\text{-}11})$	$b_3(\Delta Y_{2011\text{-}12})$	Cox-Shell	Nagelkerke	McFadden
BE	1.432	0.017	0.022	0.013	0.188	0.494	0.435
BG	0.493	0.003	0.012	0.009	0.156	0.257	0.182
CZ	0.653	0.004	0.020	0.010	0.087	0.186	0.144
EE	0.669	0.003	0.013	0.003	0.103	0.190	0.138
IE	0.681	0.003	0.014	0.003	0.058	0.120	0.091
ES	0.252	0.002	0.008	0.000	0.119	0.226	0.170
FR	0.376	0.003	0.011	0.004	0.085	0.188	0.147
IT	0.304	0.002	0.006	0.004	0.104	0.175	0.121
CY	0.342	0.002	0.011	0.008	0.118	0.190	0.129
LV	0.321	0.002	0.008	0.005	0.098	0.148	0.094
LT	1.250	0.012	0.021	0.010	0.287	0.528	0.431
LU	0.635	0.012	0.049	0.013	0.011	0.084	0.079
HU	0.308	0.002	0.009	0.004	0.146	0.245	0.174
MT	0.466	0.004	0.019	0.013	0.073	0.134	0.097
NL	1.644	0.006	0.048	0.015	0.009	0.079	0.075
AT	0.736	0.003	0.017	0.006	0.014	0.035	0.028
PL	0.349	0.003	0.010	0.004	0.058	0.143	0.115
PT	0.386	0.003	0.008	0.006	0.090	0.187	0.143
SI	0.436	0.004	0.009	0.009	0.095	0.171	0.124
SK	1.399	0.011	0.014	0.007	0.081	0.156	0.115
FI	0.947	0.009	0.017	0.009	0.079	0.262	0.229
UK	0.629	0.004	0.013	0.008	0.135	0.250	0.187
EU	0.139	0.001	0.003	0.000	0.076	0.149	0.111