Child material deprivation: within region disparities by degree of urbanization

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Child material deprivation: within region disparities by degree of urbanization

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Abstract

This paper analyses the impact of degree of urbanization on child material deprivation in Spain. Using the EU-SILC 2009 and 2014 special modules on material deprivation, we find that living in a city or town increases child material deprivation to a larger extent than household material deprivation and income. Differentiating by needs, the provision of children's basic needs does not respond to household material deprivation, income or degree of urbanization, whereas the provision of educational/leisure needs does. Our findings might be of help in designing more effective policies intended to alleviate the incidence of child material deprivation beyond income-related programmes.

Keywords: Child and household material deprivation, hierarchical data, degree of urbanization, regional disparities.

JEL-Codes: C30, I32, R20

1. Introduction

Child material deprivation and social exclusion are a widespread and persistent problem in most developed countries and have become a relevant issue on the political agenda of the majority of governments in the last few decades. It has usually been assumed that children and adults in the same household have similar deprivation levels and needs. However, recent studies have demonstrated that the needs and living standards of children can differ from those of adults although they live in the same household (Grodem, 2008; [name deleted to maintain anonymity in the review process]; Guio et al., 2018, 2020). Fighting child poverty and investing in children's well-being has featured on the European Union (EU) agenda for many years as reflected in the Europe 2020 strategy. Among other goals, the EU Recommendation calls on Member States to '(reinforce) statistical capacity [...] where needed and feasible, particularly concerning child deprivation'. These goals were also taken up again in the 2030 Agenda for Sustainable Development and the European Pillar of Social Rights (11th goal 'Childcare and support to children').[1]

At the same time, numerous countries have experienced a substantial change in urbanization levels in the last decades, with more than 70% of the population expected to live in urban areas in the near future (United Nations, 2018). The European Union has been promoting different initiatives and programmes to advance urban development (the URBAN Initiative of 1994–2006 and European Cohesion Policy initiatives since 2007) and enhance economic development and social integration in deprived neighbourhoods of medium-sized and large cities. This goal also appears in the 2030 Agenda (11th goal 'Make cities and human settlements inclusive, safe, resilient and sustainable'). Because cities are disproportionately wealthy and associated with poverty, urbanization and the reduction of poverty and deprivation are relevant to achieve sustainable development, which should be considered not only on a national but also regional scale (Liddle, 2017; Chen et al., 2019).

In this paper, we contribute to both branches of the literature by analysing three different channels through which the degree of urbanization could affect child-specific material deprivation. Following existing theories, we hypothesize that the degree of urbanization displays a direct effect and contextual effect (*Ecological Systems* theory)

[1] https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles_en

and an indirect effect coming from parents' situation (*Family Stress* and *Family Investment* theories). Most related studies analyse the relationship between household material deprivation at individual or household level. Some others consider the effects of the degree of urbanization at the country level, but regional heterogeneity within a country has been scarcely addressed in the related literature. This channel, as we revise in the next section, could have relevant implications in terms of regional policy issues. We use data on Spain from the European Union Statistics on Income and Living Conditions survey (EU-SILC hereafter) for the years 2009 and 2014, which includes a specific module on child-specific material deprivation. As we describe in detail below, the focus on Spain is justified as it has the largest incidence of child material deprivation in Europe, substantial regional heterogeneity in the degree of urbanization and high economic disparities among regions.

Our findings show that household material deprivation acts as an important driver of child material deprivation, not only directly, but also as an indirect channel through which income and urbanization affect child material deprivation. However, the effect of urbanization at the individual level is the largest, with the effect of living in a city being larger than living in a town. At the regional level, our evidence also shows that if children live in a densely populated or intermediate density region, the intensity of child material deprivation increases. Although this effect depends on the region children live in, it adds some extra negative effects on child deprivation.

Therefore, all income-related policies to alleviate child material deprivation might have a lower effect than initially intended. Moreover, given that the effect of income and degree of urbanization on child material deprivation is not direct but occurs through household material deprivation, policies should target the household situation instead of the situation of children. Additionally, achieving sustainable development requires diverse actions at the local, regional, national and international levels. The negative effect of urbanization must be placed at the forefront, which requires sufficient information and analysis. In this regard, our findings might be of help for politicians and policymakers to design the most effective policies intended to alleviate child material deprivation in upcoming business-cycle downturns beyond income-based policies.

The relevant literature is reviewed in Section 2. The empirical strategy and data are described in Sections 3 and 4, respectively. The main results are provided in Section 5, while robustness checks are in Section 6. Finally, Section 7 concludes the analysis.

2. Background

Material deprivation is generally defined as a relative lack of goods, resources or services broadly available in a society and is widely accepted as a multidimensional concept. Material deprivation is expected to provide a more absolute view of the standard of living than income poverty. To exclude choices and lifestyle preferences and differences in taste and constraints from the concept of deprivation, the recent related literature is often based on the enforced lack of items (Guio et al., 2009, 2020; Fusco et al., 2011; [name deleted to maintain anonymity in the review process]).

The related literature has traditionally assumed that children and adults in the same household have similar deprivation levels and needs. However, recent studies have demonstrated not only that the needs and living standards of children can differ from those of adults although they live in the same household, but also that parents and children may not experience deprivation to the same extent (Grodem, 2008; [name deleted to maintain anonymity in the review process]; Guio et al., 2012, 2018).

The main determinants of child-specific deprivation in the literature can be sorted into individual's characteristics (or household's characteristics) and regional/country characteristics. Income would appear to be a key factor for determining child material deprivation. However, although having more household income allows basic needs to be met, using income alone does not fully predict this kind of deprivation ([name deleted to maintain anonymity in the review process]; Guio et al., 2020). Concerning non-income variables, previous studies have found that children who do not live in a single-parent household, those in a household with fewer children where the dwelling is owned, those who live with more educated parents with good health, as well as being non-immigrant and in full-time employment report lower levels of child material deprivation (De Neubourg et al., 2012; [name deleted to maintain anonymity in the review process]; Guio et al., 2020). Regarding regional/country characteristics, [name deleted to maintain anonymity in the review process] and Guio et al. (2020) concluded that country-specific characteristics are crucial to explain differences in child material deprivation across European countries. In particular, it has been shown that social policy generosity and inequality level are significantly associated with household material deprivation.

In this literature, the degree of urbanization has been included as another non-income individual characteristic without considering possible channels through which it could affect child-specific material deprivation. Three different but complementary

theories have been proposed to explain rural-urban differences in poverty (as a broad concept that is not only monetary but also multidimensional). First, the *Family Stress Theory* focuses on the relationships and interactions between parents and children and how such relationships may be adversely affected by family financial difficulties and in turn fail to fulfil children's needs (McLoyd, 1998; Conger and Conger, 2002). Second, the *Family Investment Theory* proposes that economic resources determine the extent to which families can provide learning materials at home, such as books and computers, as well as access to resources outside the home as children get older, such as sports and afterschool activities (Bradley and Corwyn, 2002; Duncan and Magnuson, 2003). These two theories are in line with Becker's theory of families and altruism (Becker, 1981) and with the economic literature on intergenerational links. They are also related to the main determinants in the empirical literature (the income and non-income characteristics mentioned above, including degree of urbanization). However, neither of these two theories explicitly captures the nuances between rural and urban settings and how they may differentially impact on children. Third, the *Ecological Systems Theory* posits that child status (development, poverty, etc.) might be influenced by experiences arising from the specific settings in which they grow up (Bronfenbrenner, 2005). Certainly, rural and urban areas are specific and distinct settings, and may therefore be associated with distinct patterns of material deprivation.[2]

We now revise how these two specific settings (i.e. rural versus urban) might affect children differently in various dimensions. We refer to these dimensions as "contextual factors", which can be of a diverse nature and cover different levels. At the neighbourhood/region level, the literature has shown that urban areas, although generally less poor, also include marginalized urban settings where children are exposed to high rates of crime, violence, abuse, housing deterioration and poverty and crowded housing and are more vulnerable to natural disasters or negative events (i.e. divorce, mental health problems, noise, etc.). However, they also have higher quality houses and health care and higher formal support for services (Ravallion et al., 2007; Shucksmith et al., 2009; Glaeser and Resseger, 2010; Chiarini et al., 2017; Cook et al., 2022).

Urban areas are more resilient to labour market shocks (Ayala et al., 2021; Behrens et al., 2021). Moreover, the geographical agglomeration of people and firms can lead to lower production costs and higher productivity and income (Krugman, 1991; Fujita et al.,

[2] In line with Daly et al. (2008), the geographical location of a region is relevant in determining the level of child material deprivation.

1999; Quigley, 2008) although segregation within cities could increase unemployment (Alivon and Guillain, 2018). Additionally, some benefits of urban areas come with related costs, such as higher housing and living costs in general, but urbanization can increase the wages of rural workers, since firms are concentrated in cities and attract both urban and nearby rural workers, thus reducing rural poverty (Arouri et al., 2017).

Poverty by degree of urbanization has been analysed under the stereotype that poverty is lower in urban areas but more sensitive to economic downturns. However, rural areas are not exempt from significant risk regarding the vulnerability of households, which may exhibit a greater incidence and persistence of poverty (Ayala et al., 2021). There is also limited evidence to predict to what extent rural areas may suffer less from poverty during recessions. The possible effects of recessions on multidimensional deprivation in rural areas are closely related to each area's demographic and economic characteristics, as well as to a variety of institutional factors that may or not provide protection against adverse shocks (Glover, 2012; Capello et al., 2015; Giannakis and Bruggeman, 2017).

In terms of public services related to education (mainly at the regional level), rural schools are composed of smaller classes; a factor that is related to higher achievement but most likely lower quality teachers as they are more difficult to recruit in these areas (Tine, 2017, among others). In health care services, there is also evidence of this urban-rural disparity (Matz et al., 2015 among others). Numerous policies and/or programmes include funding formulas attached to a minimum number of citizens, students, patients, etc. Because resource allocation rules use a per-individual basis, rural areas receive less.[3]

Thus, in summary, urbanization provides a unique political, economic, cultural and educational environment, and offers better health services, more access to resources, labour market opportunities and, in general, increased opportunities for quality of life. Nonetheless, these benefits come with related costs. In practice, the impact of urbanization on poverty depends on the process and nature of the urbanization (Bloom et al., 2008; Kumar et al., 2009).

At household level,[4] but interconnected to the previous one, rural parents work more hours and earn less than their counterparts, have irregular working hours and schedules

[3] All the factors described at neighbourhood and public good level are called "locally related deprivation" in Burke and Jones (2019). The last one concerning population size is called the "spatial scale" problem by these authors.

[4] In their theoretical framework, Burke and Jones (2019) called this channel "household deprivation".

and travel longer distances to work, school or public services. Moreover, parents in rural areas have a lower education and differ in their parenting preferences as they invest less (financially and in time) in educational material and cultural experiences. However, patterns of marriage dissolution are increasing in rural areas and becoming similar to their urban counterparts (losing the advantage of two-parent versus single-parent households).

Hence, although recent studies have examined the relationship between level of urbanization and poverty or deprivation (Daly et al., 2008; De Neubourg et al., 2012; Martínez-Vazquez et al., 2014; Arouri et al., 2017; Liddle, 2017; Chen et al., 2019; Ayala et al., 2021), the limited evidence makes it difficult to predict the urbanization gap in multidimensional poverty at the household level, and even less so in child material deprivation. As Ayala et al. (2021) pointed out, the higher incidence of poverty in rural areas is unquestionable and often opposed to the hypothesis that material deprivation is lower in these areas. This lack of sufficient evidence and the non-conclusive effect of degree of urbanization may be explained by the fact that urbanization could exert all these opposite effects (Bruder and Unal, 2017; Liddle, 2017).

Following the previous theories and literature findings, in the present manuscript we incorporate three different mechanisms by which the degree of urbanization could influence child-specific material deprivation: (i) the direct effect of the degree of urbanization; (ii) the indirect effect that the degree of urbanization exerts on child-specific material deprivation by affecting household material deprivation; and (iii) the contextual effect in terms of the region where the children live. The direct effect and the contextual effect are explained by the *Ecological System* theory but measured at different level. While the direct effect captures how living in a city or town can affect children (with respect to rural areas), the contextual effect reflects how the concentration of cities or towns in the region of residence can affect children's situation. We have seen that both levels present different nuances in terms of the positive and negative effects of multidimensional poverty. The indirect effect responds more to the influence of parents' decisions and situation (*Family Stress* and *Family Investment* theories). The degree of urbanization affects adults' outcomes in terms of the labour market, parenting practices and other factors as seen before, but it is part of their decisions and investments to pass such effects on to their children.

Spain presents some distinctive features that merit attention. First, as Jurado and Pérez-Mayo (2008) and Ayala et al. (2021) have argued, the territorial distribution of the country is a key aspect to consider when analysing poverty and policies, since it allows

us to identify different socio-economic causes that could lead to more efficient policies. This idea is especially relevant in Spain because the country has a marked administrative decentralization with wide-ranging powers in the provision of social protection. Moreover, the regions of Spain have different economic, demographic and geopolitical structures, which produce important disparities in poverty levels. In addition, an analysis at regional level is of interest in the case of Spain given the country's clear geographic pattern of poverty, with the southern zone being the most affected (for more details, see Ministerio de Sanidad, Servicios Sociales e Igualdad, 2013).

Secondly, due to the different characteristics of rural and urban areas, the degree of urbanization is also an important factor to take into account. The rural areas of Spain are in a continuous process of economic transformation where agricultural activities are being replaced by other activities that are significantly transforming the rural economy (Alguacil et al., 2004). Nonetheless, rural areas exhibit several characteristics, such as population aging and a large dependence on the pension system, low qualification of individuals or the lower availability of full-time and permanent jobs, which makes it necessary to compare rural and urban poverty in order to combat poverty in a different and specific way in each of the areas (Jurado and Pérez-Mayo, 2008). For instance, as explained in Herrero-Alcalde and Tranchez-Martin (2017),[5] health is a factor that is both a cause and an effect of poverty, leading to a vicious circle of child poverty. Given that large hospitals are located in big cities, access to the health system differs for urban and rural citizens; an aspect which should be considered in defining public policies specifically related to child poverty.

Two final phenomena must also be mentioned. Firstly, there is an increasing interdependency between rural and urban areas in Spain (physically, financially, functionally and culturally). Torre (2015) showed that rural growth often occurs due to the expansion of nearby cities or more long-distance urban demand for rural products. Secondly, there has been a renewed process of migration from rural to urban areas, especially in Spain where the depopulation process is particularly pronounced. The effect of depopulation due to the aging of rural areas has been widely addressed in the literature, but little is known about the children that remain in rural areas compared to those that move to urban areas. The lack of public services in these rural areas could have a harmful effect on the entire rural population and on children in particular.

[5] Herrero-Alcalde and Tranchez-Martin (2017) pointed out that territorial differences in access to essential public services are very marked in Spain.

As regards the incidence of material deprivation, EUROSTAT data for Spain show that 22% of adults were in a household material deprivation situation in 2014 (21% in EU). When focusing on the child-specific material deprivation rate, we find larger differences between Spain and the EU. According to EUROSTAT, the child-specific material deprivation rate for 2014 was 28.3% in Spain, while it was 23.2% in the EU.

Spain also exhibits a large heterogeneity across regions. For instance, considering the lack of one item, the incidence of child deprivation in Spain for 2014 was larger in regions classified as east (Catalonia 19.2%) and south (Murcia 23%) than in regions classified as centre (Castile-La Mancha 7%), northwest (Galicia 4%) and northeast (La Rioja 5.4%).[6]

The degree of urbanization in Spain also varies notably across regions. A map of the degree of urbanization is shown in Figure 1 (panel A). As can be observed, the percentage of villages appears to be larger in the centre of Spain, with the region of Extremadura having the most (36%). The percentage of towns appears to be larger in some regions in the east and northwest of the country, with Baleares being the region with the most (54%).[7] Finally, the percentage of cities seems to be larger in specific regions in northeast, northwest and southern Spain. Thus, there is no pattern of degree of urbanization by region. Additionally, the highest levels of child material deprivation (Figure 1, Panel B) can be found in the south and northeast regions of Spain, as well as on both islands. Note that only the northeast regions have a higher percentage of cities.

---------- Insert Figure 1 in here ---------

The EU-SILC data for Spain in 2009 show that the percentage of the population in a situation of material deprivation was higher in densely populated areas (16%) than those of intermediate density (14%) or thinly populated ones (12.4%), whereas this pattern reversed in 2014 (22%, 24.3% and 24.8% for cities, towns and villages, respectively).[8] Thus, the incidence of child material deprivation has evolved over time from being highest in densely populated areas in 2009 to being highest in thinly populated areas in 2014. This would be in line with the opposite effects mentioned above. Public policies and the economic recovery might have pushed the positive effect of living in cities.[9] At

[6] See Figure A1 in the Supplemental Material.
[7] See also Figure A3 in the Supplemental Material for specific data.
[8] See Figure A2 in the Supplemental Material.
[9] Murphy and Scott (2014) and Ayala et al. (2021) highlighted the lower effect of economic crises in rural areas, but the literature is not conclusive. Our finding would suggest that even if this were the case, the recovery from the crisis may be smaller as well.

the same time, rural depopulation and the possible lack of public investment or/and labour opportunities may have increased the negative effects of rural areas in terms of child material deprivation in Spain.

Figure 2 plots the degree of urbanization and child and household material deprivation at regional level. We find that there is an inverted U-shaped[10] relationship between child material deprivation and the percentage of cities in the regions. This relationship holds for household material deprivation but is less pronounced. As regards the percentage of towns, the relationship becomes almost linear (although still positively related), whereas for the percentage of villages there is an almost linear negative relationship.

---------- Insert Figure 2 in here ---------

3. Empirical strategy

We account for the hierarchical structure of data consisting of individuals nested into regions. The most natural methodology to deal with hierarchical data would be the multilevel technique. However, given the small number of regions (17) and following related papers such as Oswald and Wu (2010) and Bryan and Jenkins (2016), we use a two-step approach to perform our analysis, one regression at the individual level and another regression at the regional-cohort level. Thus allowing us to control for both individual and aggregated level characteristics. Among other advantages of the two-step approach, Bryan and Jenkins (2016) pointed out its ability to make explicit sources of data variation that underlie the estimates.[11] In addition, because the estimated coefficients are unbiased, the two-step approach can be seen as a benchmark for comparison with other approaches.

Specifically, we use pooled data from both waves. Therefore, our data cover two years for 17 regions, which leads to a total of 34 regional cohorts that are included in the estimation. In the first step, our dependent variable is the child material deprivation index (CD_i), which will be modelled as:

$$CD_i = \beta_0 + \beta_1 HD_{\mathrm{i}} + \boldsymbol{X}_i'\beta_2 + \boldsymbol{C}_{rt}'\beta_{rt} + u_i \qquad (1)$$

where HD_i is the household index for material deprivation and vector $\boldsymbol{X}_i$ contains information on household and parental characteristics and Term β_{rt} represents the

[10] We adjust a polynomial of degree 2 given the evidence found in Liddle (2017).
[11] Bryan and Jenkins (2016) reviewed this and other modelling approaches using multilevel country data. Given our limited number of regions, the use of multilevel analysis could bias our results.

regional-cohort coefficients, which capture the remaining differences across regions, *r*, and over time, *t*, in level of child material deprivation. The estimated coefficients of these regional-cohort dummies will be negative (resp. positive) for those regional-cohorts in which the incidence of child material deprivation is lower (resp. higher) than what we would expect given household and parental background variables. This term β_{rt} might combine both observed and unobserved regional-cohort characteristics—that is, $\beta_{rt} = \boldsymbol{Z}'_{rt}\gamma + e_{rt}$, where $\boldsymbol{Z}'_{rt}$ contains variables summarizing regional-cohort-level features. As pointed out by Bryan and Jenkins (2016), it is interesting to highlight that Step 1 uses only within-region cohort variation to estimate the parameters at individual level, while between-region cohort variation is also used in other multilevel techniques.

In the second step, we use the estimated coefficients of the regional-cohort dummy variables, $\hat{\beta}_{rt}$, as the dependent variable of a model that includes variables at the regional level as explanatory variables. Specifically, we incorporate regional information related to the density of an area in region *r* in year *t* in the vector $\boldsymbol{Dense}_{rt}$ plus other variables of interest in vector $\boldsymbol{Z}_{rt}$ that characterize these regions and cohort. Additionally, we include year and region fixed effects denoted by θ_t and θ_r, respectively, as follows:

$$\hat{\beta}_{rt} = \alpha_0 + \boldsymbol{Dense}'_{rt}\alpha_1 + \boldsymbol{Z}'_{rt}\alpha_2 + \theta_t + \theta_r + \epsilon_{rt} \quad (2)$$

An important concern when analysing the casual impact of household material deprivation on child material deprivation is the existence of some possible sources of endogeneity regarding the relationship between both kinds of deprivation included in CD_i and HD_i. Thus, we now estimate a set of equations consisting of equation (1) and a household material deprivation equation as follows:

$$HD_i = \lambda_0 + \boldsymbol{W}'_i\lambda_1 + \theta_t + \theta_r + v_i \quad (1')$$

where $\boldsymbol{W}_i$ is a set of household and parental characteristics.

Equations (1) and (1') might both be linked through observed and unobserved variables (Wooldrige, 2010; Roodman, 2011), which can lead to biased estimates due to confounding. A natural extension to address this concern would be an instrumental variables approach. Unfortunately, it is very difficult to find valid instruments which serve that purpose in large scale surveys like the one we use in this paper. An alternative attempt would be to rely on dynamic panel models. Nonetheless, this via is also far from ours as our analysis is based on cross-sectional data.

The approach followed in this paper is to simultaneously estimate equations (1) and (1') to control for the fact that unobserved covariates may influence child and household

material deprivation simultaneously. To do this, we go beyond the two-step approach of Bryan and Jenkins (2016) and control for endogeneity problems using two different additional methods in the first step. First, we adapt the *control function method* (CFA) to eliminate the effects of unobserved confounding (Heckman and Robb, 1985; Newey et al., 1999). The control function approach to estimating consistent effects consists of two estimation stages: (i) a household material deprivation model and (ii) a child material deprivation approach on the level of household material deprivation and the residuals from the first-stage regression (the control functions).[12] Second, we estimate *recursive mixed-process models* (CMP, Roodman, 2011). These models also jointly estimate child and household material deprivation and are a limited information maximum likelihood estimator. This method allows for mutual interdependencies across deprivations and tries to capture the existence of both kinds of deprivation and the possible correlation between them.

4. Data and variables

4.1. Data

For our empirical analysis, we use micro-data from the specific modules of EU-SILC concerning material deprivation (2009 and 2014 waves).[13] Data relating to the living conditions of children are not collected from the children themselves (unit of analysis), but from the household respondent (unit of measurement). According to the survey protocol, if at least one child in a household does not have an item, it is then assumed that all the children belonging to the household lack that item. The analysis is done over a sample of 4,494 observations distributed across the following 17 Spanish regions: Galicia, Asturias, Cantabria, the Basque Country, Navarre, La Rioja, Aragon, Madrid, Castile-La Mancha, Castile and Leon, Extremadura, Catalonia, Valencia, the Balearic Islands, Murcia, Andalusia and the Canary Islands.

4.2. Variables

4.2.1. Child material deprivation index

The EU-SILC provides information for fourteen specific items related to children for the year 2009, while only thirteen items, which successfully passed the four tests of

[12] This method avoids problems of forbidden regression as pointed out in Wooldridge (2010).
[13] The special modules are only available for waves 2009 and 2014.

suitability, validity, reliability and additivity in 2009, are available for 2014 (for more details, see Guio et al., 2012). For the sake of homogeneity of both waves, we select the eleven items that passed the four tests for both waves (see, Guio et al., 2018). The first four items are related to *basic needs*, while the remaining items are related to *education and leisure needs* (see Table 1 for specific items).

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

Following Guio et al. (2009), we build a *frequency-based weighting* child material deprivation index CD_i as:

$$CD_i = \sum_{j=1}^{J} w_{jr} I_{ijr}$$

where w_{jr} denotes the weight corresponding to each item j where the weight is equal for children living in the same region r. The weight associated to each item corresponds to the percentage of individuals having the item in each region. Thus, this option considers that people attach greater importance to shortfalls in items where a majority does not fall short, without any value judgment and allows the deprivation score of a given individual to increase if her/his conditions do not change, but all other individuals are better off. Additionally, the index takes into account variations in the possession of any item across countries due to economic, social and cultural differences; and this approach is robust to the inclusion of items which are only relevant for a small portion of the population (Desai and Shah, 1988). The dichotomous indicator I_{ijr} for each item j, individual i and region r takes the value of 1 if the item is not affordable.[14] CD_i equal to 0 means that a child does not lack items, while if it equals 1, the child lacks all items. As pointed out by Fusco et al. (2011), the use of weights could reflect the relative importance of individual items in the different regions.[15] Moreover, it measures the intensity of child material deprivation and is free of ad-hoc decisions such as a threshold to decide who is deprived or not. In Table 2, we observe that the incidence (average and intensity) of child material deprivation is larger in 2014 than in 2009.

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

[14] Following Figari (2011), we normalize the index by the sum of all weights to permit comparisons across Spanish regions.

[15] Note that the counting approach (Atkinson, 2003) is just a special case of this index if one assumes equal weights for all items.

4.2.2. Explanatory variables

We first include the household material deprivation index (HD_i), defined as a frequency-based weighting index with the standard items considered in the Europe 2020 strategy.[16] On average, in our sample we observe that the incidence of household material deprivation is increasing over time (Table 3). Indeed, it is interesting to note that according to the standard measure of considering a child as deprived if he/she lives in a deprived household, the incidence would be higher than if we consider child-specific material deprivation for both years.

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

The data for 2009 (2014) reveal that neither the household nor the children were deprived in 48.3% (43.5%) of households. This supports the idea that parents and children do not experience material deprivation to the same extent. For example, in 2009, children were not materially deprived in 38.3% of the households, but the household was moderately deprived (there was a lack of at most three items). This percentage was 32.7% of the households in 2014.

Degree of urbanization is measured using the DEGURBA classification implemented by EUROSTAT[17] and comprises three types of areas: densely populated areas (cities or large urban areas); areas of intermediate density (towns and suburbs or small urban areas) and thinly populated areas (rural areas). We build two dummy variables, *Cities* and *Towns*, which take the value of 1 if the household is located in a city or town, respectively. In our sample, almost half the sample lives in cities (48.1%), while 25% lives in towns.

There is a huge degree of heterogeneity across regions and there is no clear pattern regarding the incidence of child material deprivation by degree of urbanization. For instance, in Galicia, Madrid or the Canary Islands, children experience less material deprivation in towns and cities than in villages (around 4% for cities and 5% for towns); in Asturias and Catalonia child material deprivation is around 6% larger in villages than in towns; and in the Basque Country, Valencia and Andalusia children also experience more deprivation in cities and towns than in villages, although to a larger extent in cities (around 3.5%).[18]

[16] See Table A1 for specific items defined in EUROSTAT.

[17] Eurostat groups together all LAU2s (Local Administrative Units-Level 2/municipalities) using a criterion of geographical contiguity in combination with a minimum population threshold based on population grid square cells of 1 km^2.

[18] See Figure A4 in the Supplemental Material.

In terms of the rest of the individual-level controls, we adopt the standard characteristics in this literature: income, age, household structure (marital status and age and number of children), type of tenure, objective health status, immigrant status, educational attainment and employment characteristics.[19]

At the regional level, we include the most standard variables used in related studies ([name deleted to maintain anonymity in the review process]; Guio et al., 2020). Particularly, we include GDP, inequality, poverty and social exclusion level, educational level and employment rates. As regards policy variables, we follow ([name deleted to maintain anonymity in the review process], who concluded that the most effective social benefit functions to reduce child material deprivation are not necessarily those targeted at children (for instance, employment benefits). Therefore, we include public expenditure on protection and social promotion and the production of preferential public goods as policy variables. The first captures the welfare state (social policy generosity) and is the sum of expenditure on pensions, social services and social promotion, promotion of employment and access to housing and promotion of building. The second one includes expenditure on health, education, culture and other expenditures usually associated with an improvement in quality of life. The variables were drawn from various databases: Eurostat, INE and the Spanish Ministry of Finance and Public Administrations.[20]

We also construct the indicators *Cities_reg* and Towns*_reg*, which reflect the percentage of cities and towns in each region, respectively. Almost half the regional territory is concentrated in cities, although the proportion by regions is different and ranges from 12% to 80%. The average proportion of towns is lower than that of cities (almost 24%) and also presents a large variability since it ranges from 7% to 74% among Spanish regions. The relationship between degree of urbanization, child material deprivation and the remaining regional characteristics is also rather heterogeneous. For instance, Madrid is the region with the highest GDP per capita, whereas Extremadura presents the lowest. This does not correspond with the regions with the lowest and highest child material deprivation level or spending on protection and social promotion. For instance, Extremadura is the region with the highest spending on social protection but is one of the regions in the ranking with a high level of child material deprivation. The

[19] Specific details of how variables which capture these socio-economic characteristics are built and main descriptive statistics are relegated to Table A2 and A3, respectively, in the Supplemental Material.
[20] The regional values for these variables are relegated to Table A4 in the Supplemental Material. The relationship of child material deprivation at regional level with GDP per capita, inequality and variables concerning public policies to reduce poverty are plotted in Figure A5 of the Supplemental Material.

Spanish region with the highest (lowest) child material deprivation level is Murcia (Navarre). Note that Murcia is also the region with the highest production of preferential public goods, while Navarre is the region with the lowest. Focusing on Navarre, we also observe that it ranks among the first positions in terms of GDP, employment, percentage of people with tertiary education and spending on social protection and among the last in terms of unemployment, inequality and poverty risk. Moreover, it is one of the regions where less big cities predominate. Taking all of this in mind, we have a first intuition about the relationship between child material deprivation and the regional variables.

5. Results

We estimate three different models: the first one without considering endogeneity and the others introducing endogeneity through two different methods, CFA and CMP. We first estimate a version of Equation (1) without an individual or family explanatory variable $\boldsymbol{X_i'}$ and which only contains regional-cohort dummies, β_{rt} (column 1 in Table 4). This model gives us information about the differences across regions and cohorts in terms of the level of child material deprivation without accounting for individual variables. Second, we include the set of parents and family background variables (column 2 in Table 4).

-------- Insert Table 4 here --------

The χ^2 test at the bottom of Panel A shows that that there are residual (non-random) differences across regions and time in the incidence of child material deprivation that cannot be explained by the set of household and parents' variables we are using. This heterogeneity might be due to economic and social differences across regions and time, among which we consider the degree of urbanization. We address this point in the second step. In addition, observe that the size of χ^2 is larger in the model with no explanatory variables than the model including individual variables. This finding suggests that child material deprivation intensity cannot be explained only by regional-cohort variables.

As can be observed in Table 4 (column 3), for the OLS estimation of the general index, the intensity of household material deprivation increases the intensity of child material deprivation, while income reduces it. Note that our variables of interest *Cities* and *Towns* are not significant differently from zero. In terms of size, we find, as in Grodem (2008), that household material deprivation is of a higher order of relevance for child material deprivation than household income (Table 5). An average increase of 10%

in household material deprivation (household income) would imply an average increase of 13.6% (decrease of 6.4%) of child material deprivation.[21]

-------- Insert Table 5 here --------

For the rest of the socio-economic variables we find that these effects are quite standard in the literature (see, for example, ([name deleted to maintain anonymity in the review process] and Guio et al., 2008, 2020). [22]

Once we control for possible endogeneity in household material deprivation (columns 3-4), we can distinguish between a *direct* effect, measured by the estimated parameter in the equation of child material deprivation (Equation 1), and an *indirect* effect, measured by the estimated parameter in the equation of household material deprivation (Equation 1') and then through the household material deprivation parameter on child material deprivation.

We find that household material deprivation remains positive and turns out to be larger than before (a 21.7% increase). Household income is no longer directly associated with child material deprivation, but higher household income is associated with lower household material deprivation, which will result in lower child material deprivation (indirect effect, 9.3% decrease).[23]

In terms of the effect of living in a city or a town, we again find that there is only an indirect effect on child material deprivation through household material deprivation. Thus, living in a city (town) increases average household material deprivation by 84.0% (47.2%).[24] The standard result in the related literature is that income reduces child material deprivation and living in a city increases child material deprivation ([name deleted to maintain anonymity in the review process]; Guio et al., 2018, 2020). However, our analysis shows that neither has a direct effect on child material deprivation but rather on household vulnerability. This finding could have potential implications for policy measures to reduce child poverty risk, as we should act on measures to improve the whole household situation. Our results highlight the role of intergenerational links in the child material situation ([name deleted to maintain anonymity in the review process]).

[21] This implies 0.005 (0.002) units more (less) of child material deprivation. In other words, one standard deviation increase in household material deprivation (household income) accounts for 56.6% (16.4%) of a standard deviation increase in child material deprivation.
[22] Specific results can be found in Table A5 of the Supplemental Material.
[23] The results for CMP are similar. In particular, the effects become 23.2% and 10.9%, respectively. Note that we only quantify the indirect effect, as the direct effect is no longer statistically different from zero. The total effect would imply an average decrease of 12%.
[24] The results for CMP are slightly lower and account for 67.1% in cities and 39.5% in towns.

Next, we present the results of Step 2 (Panel B in Table 4).[25] We have included a polynomial model of degree two for the degree of urbanization. When endogeneity of household material deprivation is not accounted for (OLS model), we find a U-shaped relationship only with the percentage of cities[26] (as in Liddle, 2017 with a similar turning point around 15%) and an inverted U-shaped relationship with the percentage of towns.

Nonetheless, when we take endogeneity into account, we find an inverted U-shaped relationship between *City_reg* and child material deprivation, whereas a linear pattern (coefficient of the squared variable is not significantly different from zero) for *Town_reg*. That is, a larger percentage of cities are initially associated with higher levels of child material deprivation, but such increases are ultimately related to lower levels of child material deprivation. The estimated turning point is about 46% of cities in the region, and for those regions (mainly in the south and northeast of the country) the larger percentage of cities is related to lower levels of child material deprivation. Additionally, the higher the percentage of towns, the higher the level of child material deprivation. To illustrate the size of the effect, note that a 10% increase in the average degree of city (town) urbanization will decrease child material deprivation by 13.2% (1.1%).

The rest of the regional characteristics display the expected effect. Among them, note that the greater the expenditure on social protection (as a % of total expenditure), the lower the child material deprivation. Surprisingly, however, the larger the expenditure on public goods, the higher the child material deprivation. This last interpretation might be due to the items considered in the child material deprivation index. Although a region might spend more on health or education, this does not guarantee that the most deprived children will have access to items related to educational needs. In other words, higher spending on education, for example, would lead to a higher quality of this public service. However, this does not mean that this specific measure helps children directly or through their parents, as the children might not have access to appropriate books for their age or be able to participate in school events that cost money, which would not reduce the child's material deprivation.[27]

[25] The rest of the regional characteristics are relegated to Table A5 of the Supplemental Material.

[26] Note that in Figure 2 we also find an inverted U-shaped relationship, even though we plot their unconditional average values.

[27] We have also performed the analysis including other regional variables related to expenditure on public services and the results of our variables of interest do not change (see Table A6 of the Supplemental Material). We observe that the significance and sign of our variables of interest remain the same regardless the disaggregation of the policy variables.

To sum up, we find that household material deprivation acts as an important driver of child material deprivation; not only directly, but also as an indirect channel through which income and urbanization affect child material deprivation. However, while the effect of urbanization at the individual level is the largest, the effect of living in a city is larger than living in a town. Our evidence also shows that, at the regional level, if children live in a densely populated or intermediate density region, there is an increase in the intensity of child material deprivation. However, this effect would depend on the region children live in, but it adds an extra negative effect on child deprivation.

The two years for which data are available, 2009 and 2014, present some distinctive features. Recall that 2009 marks the year just after the crisis and 2014 coincides with the economic recovery. To capture whether the degree of urbanization, household income and household material deprivation could have affected child material deprivation differently in 2009 than in 2014, we present the estimation results in Table 6.

-------- Insert Table 6 here --------

We add the interaction of our variables of interest and the year 2014. Therefore, we just fix 2009 as the reference period. We find that the effect of household material deprivation on child material deprivation is larger in 2014 (the unique interaction that is significantly different from zero) than in 2009. At the individual level, there are no differences between both periods. At regional level, however, we find some additional differences. The inverted U-shape for the percentage of cities is more pronounced in 2014 than in 2009, although the turning point is similar (48% versus 54%). For 2009, we find that the percentage of towns also exhibits an inverted U-shaped relationship with child material deprivation rather than a linear relationship as in the general case, and that this relationship becomes U-shaped in 2014. This could imply that in the recovery period, 2014, a larger percentage of towns had a higher level of child material deprivation. The type of town development or the policies implemented after the recession could have favoured towns over cities or rural areas.

In terms of basic needs and educational/leisure needs separately, we only find two different results from the general ones (Table 7). First, the main difference regarding the joint index for child material deprivation stems from the fact that, once we endogenize household material deprivation, it no longer has an effect on child material deprivation in terms of basic needs (Panel A), but still has an effect for educational/leisure needs (Panel B). It seems that there is a correlation between household material deprivation and child

material deprivation, which is mostly driven by educational/leisure needs rather than basic needs. This could imply that basic needs are always met, even if the household suffers from high intensity deprivation. One of the implications of this finding is that the indirect effect of income and living in a city or town is no longer active for basic needs but is still working for educational/leisure needs.

-------- Insert Table 7 here --------

A second difference arises for educational/leisure needs due to a direct negative effect of living in a city. In this case (Table 8), we found that a 10% increase in household material deprivation increases average child material deprivation in educational/leisure needs by 21.3% and by 80.1% for living in a city (direct and indirect effect). However, the effect of living in a city on child material deprivation is still larger than the effect of household material deprivation.

-------- Insert Table 8 here --------

In terms of the regional degree of urbanization, as in the general case, the effect of the % of cities is larger than the effect of the % of towns. As in the general case, we find a U-shaped relationship for the percentage of cities. The difference arises regarding the percentage of towns, since we also find a U-shaped relationship in basic needs. The turning point, 12%, is again low enough to not affect any of the regions. In educational needs we find the general pattern, that is, the inverted U-shape.

Finally, we calculate the estimated effect of a child living in a city which consists of the sum of the individual effect that is constant across regions and the degree of urbanization of the child's region. In the related literature these two effects are estimated separately. As a reference, we take the models estimated with the CFA approach[28] and the regions with the lowest and the highest percentage of cities, which are Cantabria (northwest) and Madrid (northeast). As can be seen in Figure 3, the regional effect presents a huge variability among regions. The effect of living in a city ranges from -0.029 units for the general index in Cantabria to 0.303 units in Madrid. In the case of basic needs, the variability is lower and ranges from -0.015 to 0.189. For educational/leisure needs, the variability increases and ranges from -0.039 to 0.378 units.

------- Insert Figure 3 here --------

We also observe that the effect of living in a city always increases child material deprivation (aggregate and by dimensions) in regions in the east and south, although there

[28] Results with the CMP approach are similar.

is some heterogeneity within regions. In the northwest, northeast and centre of Spain, there is at least one region where the effect of living in a city is negative (Cantabria, Navarre, Castile-La Mancha and Extremadura). Note that in regions categorized as centre, the effect in all regions is small. Also note that living in a city has a smaller effect on basic needs than educational/leisure needs in all regions.

Finally, the effect of living in a town is always positive although small with scarce variability, and ranges from 0.005 to 0.017 units for basic needs and 0.002 to 0.019 units for educational/leisure needs.

6. Robustness check

We estimate our main specifications considering three modifications concerning how we measure household material deprivation: (i) the non-linear version of the index, (ii) the counting approach index and (iii) the fact of being deprived. The results are reported in Table A7 of the Supplemental Material. The results are similar to our benchmark case for the non-linear version of the index and the fact of being deprived. When we did consider the fact of being deprived (Panel D), we surprisingly found that household material deprivation decreases the probability of children being deprived. This finding could be interpreted as the household protecting the children, as we found in the descriptive analysis. There is a larger proportion of households which are deprived and whose children are not than deprived households with deprived children. Additionally, we do not find any direct or indirect effect of the degree of urbanization. In this case, the size of household material deprivation and household income are fairly similar.

We now analyse another form of non-linearity in the effect of household material deprivation and income which consists of defining their quintiles. The estimation for our main variables of interest are reported in Table A8 of the Supplemental Material.[29]

We first note that household material deprivation increases child material deprivation if the intensity of the former is sufficiently high (HD_i (Q4) and HD_i (Q5)). Unlike the main results, quantiles do not mask the effect of those who do not suffer or suffer low intensity deprivation. This could also be helpful to interpret the fact that the intensity of household material deprivation reduces the probability of children being deprived found earlier. The influence of income on child material deprivation is constant along quintiles.

[29] Note that with the CFA methodology, the effect of household material deprivation takes into account the effect of the latent factors, and for HD_i *(Q2)* and HD_i *(Q3)* the combination of both implies an effect which is not significantly different from zero.

Finally, we have added some analyses to incorporate a broader view at the European level comparing Spain with the European Union as a whole.[30] Our results show three main differences. First, in the European Union, living in a city has a negative direct effect on child-specific material deprivation. No such effect was found for Spain (Table B3). Secondly, in the European Union, although the intergenerational link operates (household material deprivation affects child-specific material deprivation), the degree of urbanization does not generate any effect on household deprivation. Thus, there is no indirect effect. In Spain, the indirect effect arises from both cities and towns. Thirdly, in the European Union there is an inverted U-shaped relationship between the percentage of cities (*City_reg*) and child material deprivation (maximum achieved at 35.81%). In Spain, there is a U-shaped relationship between the percentage of cities and towns (*City_reg* or *Town_reg*) and child material deprivation (minimum achieved at 9.37% and 26.09%, respectively). In Figure A6 we have plotted a simulation of the contextual effect of the degree of urbanization on child-specific material deprivation, where the above patterns can be seen. Finally, in the case of the European Union, the correlation between child and household material deprivation is significant and negative, which has not been found for Spain. This means that the unobservables, which affect household material deprivation, reduce child-specific material deprivation.[31]

7. Conclusions

Spain is one of the European countries with the highest child poverty. Indeed, child poverty levels increased more than in other European countries during the last economic crisis. As pointed out by Cantó and Ayala (2014), this could be a result of the limited resources invested in child protection and the limits of tax and cash benefit systems to alleviate this problem. In particular, the weight of family policies was traditionally low. It would not be until 2008, at the beginning of the crisis, when the reforms led to the creation of some new family benefits and the expansion of some already existing ones. This involved not only actions at the central government level, but also by regions that decided to develop their own family benefit policies. Nonetheless, in 2010, in the middle

30 We relegate all details regarding the regional structure by countries to Supplemental Material (Appendix B).

31 In the Supplemental Material (Appendix B), we have also included a discussion regarding the selection of comparisons and estimation results for some countries for which we have enough information about regions. In the EU-SILC data set, the most similar case in terms of the number of regions available is France. However, as in the case of Europe as a country there is no indirect effect of the degree of deprivation on child-specific material deprivation through household material deprivation.

of the crisis, spending on social protection dedicated to families and children fell significantly. The effectiveness of such policies, however, has not been proved. Cantó and Ayala (2014) demonstrated that policies which most contribute to reducing child poverty are those related to social benefits in general. In contrast, when the policy goal is child-specific material deprivation, [name deleted to maintain anonymity in the review process] and Guio et al. (2020) showed that countries with more prosperous regions and generous social benefits systems tend to have lower child deprivation levels. Moreover, given that the most effective social benefits are not necessarily those targeted at children, it is imperative to define an ambitious system of benefits and redistributive public instruments that would reduce the high levels of child poverty in Spain. Nonetheless, these policies should not focus only on increasing individual income since, as shown previously, income is not the best driver to reduce child material deprivation. Moreover, as we have found, the degree of urbanization plays a key role in their effectiveness.

Although Spain has implemented a series of national plans outlining different policies and actions to combat child poverty since 2006,[32] it was not until the 2013–2016 plan that actions directly related to combatting poverty were included. The severe crisis affecting Spain intensified the incidence of child poverty. In addition, it should be noted that these aims do not depend exclusively on the central government but must be coordinated at the regional and local level. As part of the above-mentioned plans, in the years 2009, 2014 and 2020 different national programmes aimed at reforms were developed in Spain.[33] These programmes issue an annual report on the progress of the national reforms, which allows checking the effectiveness of the public policies in achieving the goals. Although in the first programme (2009) there was no specific information or measures to reduce child poverty, it showed that several actions had been taken to promote social inclusion and hence, indirectly, poverty. The others (2014 and 2020) included some recommendations related to poverty and social exclusion. Nonetheless, although this paper constitutes a notable advance in the analysis of factors that explain regional differences with respect to child material deprivation levels, further work is needed to analyse the causal relationship between region-specific public policy and child material deprivation and determine how to reduce it, especially in cities and towns where the incidence is higher and where most people are expected to live in the near future.

[32] See Observatorio de la Infancia (2006) and (2013).
[33] See Gobierno de España (2009) and (2014).

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Tables

Table 1. Non-monetary child deprivation indicators

BASIC NEEDS
Some new (not second-hand) clothes
Two pairs of properly fitting shoes (including a pair of all-weather shoes)
Fresh fruit and vegetables once a day
One meal with meat, chicken or fish (or vegetarian equivalent) at least once a day
EDUCATIONAL OR LEISURE NEEDS
Books at home suitable for their age
Outdoor leisure equipment (bicycle, roller skates, etc.)
Indoor games (educational baby toys, building blocks, board games, computer games, etc.)
Regular leisure activity (swimming, playing an instrument, youth organizations, etc.)
Celebrations on special occasions (birthdays, name days, religious events, etc.)
Invite friends round to play and eat from time to time
Participate in school trips and school events that cost money

Note. Variables from the EU-SILC 2009 and 2014 module on material deprivation.

Table 2. Descriptive statistics

		Mean (SD)
2009	% of not deprived	0.880 (0.325)
	Weighting index[(a)]	0.237 (0.179)
	Counting index[(a)]	2.805 (2.145)
	No. observations	2,389
2014	% of not deprived	0.777 (0.416)
	Weighing index[(a)]	0.271 (0.216)
	Counting index[(a)]	3.292 (2.539)
	No. observations	2,105

[(a)]These are conditional means on the fact of being deprived.

Table 3. Household and child material deprivation

			Household		
			Not deprived	Lack <4 items	Lack ≥4 items
2009			48.5%	47.3%	4.21%
	Not deprived	88.0%	48.3%	38.3%	1.35%
Children	Lack <6 items[(a)]	10.5%	0.22%	8.48%	1.83%
	Lack ≥6 items	1.6%	0.0%	0.45%	1.02%
No. Observations				2,389	
			Not deprived	Lack <4 items	Lack ≥4 items
2014			43.9%	47.3%	8.8%
	Not deprived	77.8%	43.5%	32.7%	1.59%
Children	Lack<6 items	17.9%	0.43%	12.9%	4.99%
	Lack≥6 items	4.30%	0.0%	1.76%	2.22%
No. Observations				2,105	

[(a)]The choice of 6 items is in line with the EUROSTAT's definition of 4 items to reflect severe material household deprivation.

Table 4. Estimation results

	Child Mat. Dep. (CD)				*Household Mat. Dep.*	
	OLS	OLS	CFA	CMP	CFA	CMP
PANEL A: Step 1						
HDi		0.553***	0.884**	0.945*		
		(0.047)	(0.276)	(0.394)		
Income		-0.023***	-0.010	-0.007	-0.037***	-0.041***
		(0.006)	(0.012)	(0.018)	(0.003)	(0.005)
Cities		-0.005	-0.015	-0.014	0.032***	0.024***
		(0.006)	(0.009)	(0.010)	(0.004)	(0.005)
Towns		0.002	-0.004	-0.004	0.018**	0.014*
		(0.007)	(0.007)	(0.008)	(0.006)	(0.006)
Household Characteristics[(a)]	No	Yes	Yes	Yes	Yes	Yes
Parental Characteristics[(a)]	No	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes
Region fixed effect	No	No	No	No	Yes	Yes
Const.	0.017**	0.170**	0.014	-0.027	0.408***	0.443***
	(0.007)	(0.054)	(0.143)	(0.209)	(0.045)	(0.054)
Correlation *(CDiHDi)*[(b)]					-0.334	-0.367
					(0.277)	(0.358)
F-test (β_{rt})	9.780	2.560	2.080	56.200		
Prob>F-test (β_{rt})	0.000	0.000	0.000	0.000		
Chi squared (β_{rt})	168.2	133.6	115.390	436412.6		
Prob>Chi-squared (β_{rt})	0.000	0.000	0.000	0.000		
R-squared	0.037	0.432	0.432			
Regionalcohort variables	34	34	34	34		
Panel B: Step 2						
Cities_reg		-0.208***	0.132***	0.132***		
		(0.003)	(0.003)	(0.003)		
Cities_reg (squared)		0.770***	-0.114***	-0.114***		
		(0.008)	(0.008)	(0.008)		
Towns_reg		0.065***	0.022***	0.022***		
		(0.005)	(0.005)	(0.005)		
Towns_reg (squared)		-0.025***	-0.011	-0.012		
		(0.006)	(0.009)	(0.009)		
Const.		0.014	-0.255**	-0.255**		
		(0.098)	(0.098)	(0.098)		
Regional Charact.[(a)]		*Yes*	*Yes*	*Yes*		
Time fixed effects		*Yes*	*Yes*	*Yes*		
Region fixed effect		*Yes*	*Yes*	*Yes*		
R-squared		0.985	0.984	0.983		
No. observations	4,494	4,494	4,494	4,494	4,494	4,494

Note. Standard errors in parentheses. + p<0.10; * p<0.05; ** p<0.01; *** p<0.001. Columns1-4 corresponds to Equation (1), Columns 5-6 to Equation (1')**.**

[(a)]The estimated parameters in Table A5 of the Supplemental Material.

[(b)] Column 5 presents the *latent factor* for the CFA estimation, whereas column 6 is the *Athrho12* coefficient from the CMP estimation.

Table 5. Estimation results (size of effects)

	OLS	CFA			CMP		
		Direct	Indirect	Total	Direct	Indirect	Total
HDi	13.6%	21.7%		21.7%	23.2%		23.2%
Income	-6.4%		-9.3%	-9.3%		-10.9%	-10.9%
Cities			84.0%	84.0%		67.1%	67.1%
Towns			47.2%	47.2%		39.5%	39.5%
Cities_reg	-23.2%	-13.2%			-13.2%		
Towns_reg	4.6%	1.1%			1.1%		

Table 6. Estimation results with time dimension (CFA approach)

	Child Mat. Dep. (CD)		*Household Mat. Dep.*	
Panel B: Step 1				
HD$_i$	0.884**	0.760**		
	(0.276)	(0.267)		
Income	-0.010	0.000	-0.037***	-0.035***
	(0.012)	(0.012)	(0.003)	(0.003)
Cities	-0.015	-0.014	0.032***	0.031***
	(0.009)	(0.012)	(0.004)	(0.003)
Towns	-0.004	-0.013+	0.018**	0.013*
	(0.007)	(0.008)	(0.006)	(0.005)
*HD$_i$*2014*		0.197*		
		(0.094)		
*Income*2014*		-0.015+		-0.003
		(0.009)		(0.006)
*Cities*2014*		-0.002		0.001
		(0.011)		(0.004)
*Towns*2014*		0.016		0.010
		(0.012)		(0.013)
Household Characteristics[(a)]	Yes	Yes	Yes	Yes
Parental Characteristics[(a)]	Yes	Yes	Yes	Yes
Time fixed effects	No	No	Yes	Yes
Region fixed effect	No	No	Yes	Yes
F-test (β_{rt})	2.080	56.200		
Prob>F-test (β_{rt})	0.000	0.000		
Chi squared (β_{rt})	115.390	436412.6		
Prob>Chi-squared (β_{rt})	0.000	0.000		
R-squared	0.432			
Regionalcohort variables	34	34		
Panel B: Step 2				
Cities_reg	0.132***	0.098***		
	(0.003)	(0.004)		
Cities_reg (squared)	-0.114***	-0.102***		
	(0.008)	(0.010)		
Towns_reg	0.022***	0.056***		
	(0.005)	(0.005)		
Towns_reg (squared)	-0.011	-0.101***		
	(0.009)	(0.012)		
*Cities_reg*2014*		0.376***		
		(0.011)		
*Cities_reg (squared)*2014*		-0.322***		
		(0.009)		
*Towns_reg*2014*		-0.175***		
		(0.009)		
*Towns_reg (squared)*2014*		0.362***		
		(0.015)		
Regional Charact.[(a)]	Yes	Yes		
Time fixed effects	*Yes*	*Yes*		
Region fixed effect	*Yes*	*Yes*		
R-squared	0.984	0.983		
No. observations	4,494	4,494	4,494	4,494

Note. Standard errors in parentheses. + p<0.10; * p<0.05; ** p<0.01; *** p<0.001.

Table 7. Estimation results by dimension

	Children Mat. Dep. (CD)			*Household Mat. Dep. (HD)*	
	OLS	CFA	CMP	CFA	CMP
PANEL A: BASIC NEEDS					
HDi	0.452***	0.504+	0.519		
	(0.065)	(0.279)	(0.322)		
Income	-0.015**	-0.013	-0.013	-0.037***	-0.041***
	(0.005)	(0.013)	(0.014)	(0.003)	(0.005)
Cities	0.002	0.001	0.001	0.032***	0.024***
	(0.005)	(0.011)	(0.009)	(0.004)	(0.005)
Towns	0.008	0.007	0.007	0.018**	0.014*
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
Correlation *(CDi, HDi)*[(a)]				-0.053	-0.065
				(0.297)	(0.307)
Cities_req	-0.188***	-0.187***	-0.187***		
	(0.003)	(0.003)	(0.003)		
Cities_req (squared)	0.533***	0.532***	0.531***		
	(0.007)	(0.007)	(0.007)		
Towns_req	-0.023***	-0.024***	-0.024***		
	(0.006)	(0.006)	(0.006)		
Towns_req (squared)	0.091***	0.092***	0.092***		
	(0.007)	(0.007)	(0.007)		
Const.	6.225***	6.182***	6.169***		
	(0.107)	(0.107)	(0.107)		
PANEL B: EDUCATIONAL/LEISURE NEEDS					
HDi	0.614***	1.114**	1.292*		
	(0.050)	(0.344)	(0.561)		
Income	-0.027***	-0.008	0.001	-0.037***	-0.041***
	(0.007)	(0.015)	(0.024)	(0.003)	(0.005)
Cities	-0.009	-0.025*	-0.025+	0.032***	0.024***
	(0.008)	(0.012)	(0.015)	(0.004)	(0.005)
Towns	-0.002	-0.011	-0.011	0.018**	0.014*
	(0.009)	(0.010)	(0.011)	(0.006)	(0.006)
Correlation *(CDi, HDi)*[(a)]				-0.503	-0.501
				(0.339)	(0.372)
Cities_req	-0.226***	-0.224***	-0.221***		
	(0.007)	(0.007)	(0.007)		
Cities_req (squared)	0.929***	0.919***	0.910***		
	(0.017)	(0.017)	(0.017)		
Towns_req	0.124***	0.116***	0.114***		
	(0.011)	(0.011)	(0.011)		
Towns_req (squared)	-0.107***	-0.099***	-0.097***		
	(0.014)	(0.014)	(0.014)		
Const.	-4.052***	-4.459***	-4.599***		
	(0.220)	(0.220)	(0.219)		

Note. Standard errors in parentheses. + p<0.10; * p<0.05; ** p<0.01; *** p<0.001. [(a)] The *latent factor* for the CFA estimation, the *Athrho12* coefficient from the CMP estimation

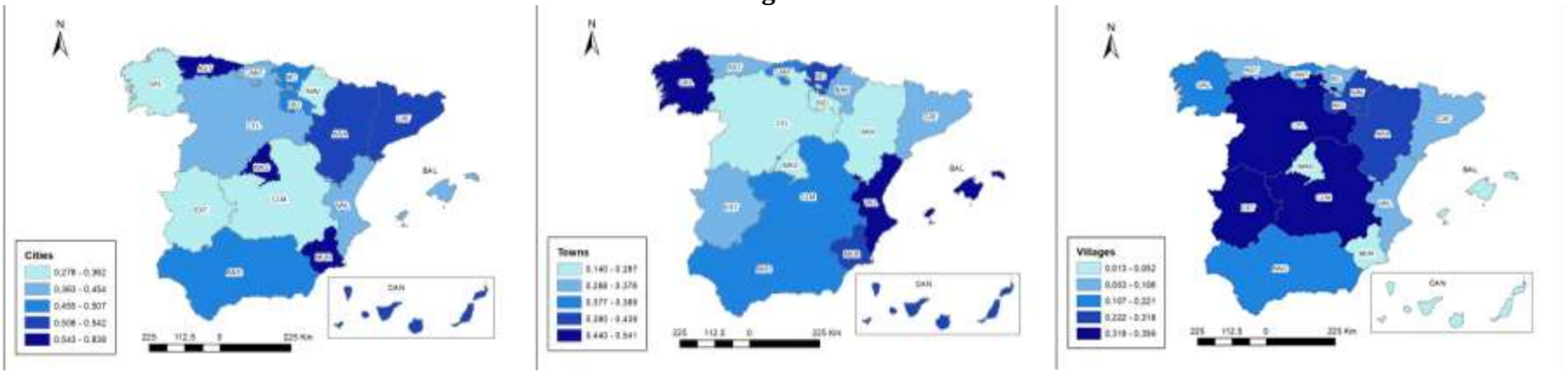
Table 8. Estimation results by dimension (size of effects)

	OLS	CFA			CMP		
Panel A: Basic Needs		Direct	Indirect	Total	Direct	Indirect	Total
HDi	20.7%						
Income	-7.9%		-9.8%	-9.8%		-11.2%	-11.2%
Cities			89.4%	89.4%		69.0%	69.0%
Towns			50.3%	50.3%		40.3%	40.3%
Cities_req	-40.9%	-40.7%			-40.7%		
Towns_req	-2.8%	-2.9%			-2.9%		
Panel B: Educational/leisure needs							
HDi	11.8%	21.3%		21.3%	24.7%		24.7%
Income	-6.0%		-9.1%	-9.1%		-11.7%	-11.7%
Cities		-2.5%	82.7%	80.1%		71.9%	71.9%
Towns			46.5%	46.5%		41.9%	41.9%
Cities_req	-19.2%	-19.1%			-18.8%		
Towns_req	6.7%	6.3%			6.2%		

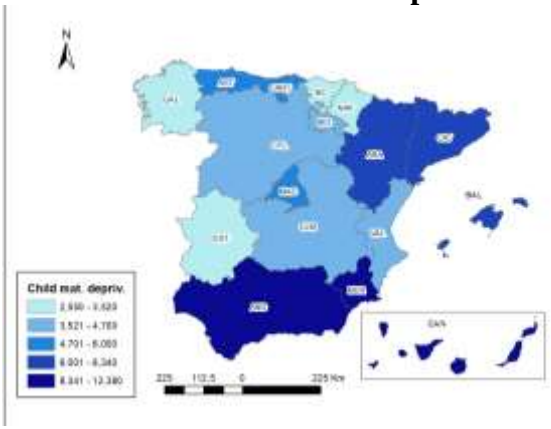
Figures

Figure 1. Maps of degree of urbanization and child material deprivation (2014)

Panel A. Degree of urbanization

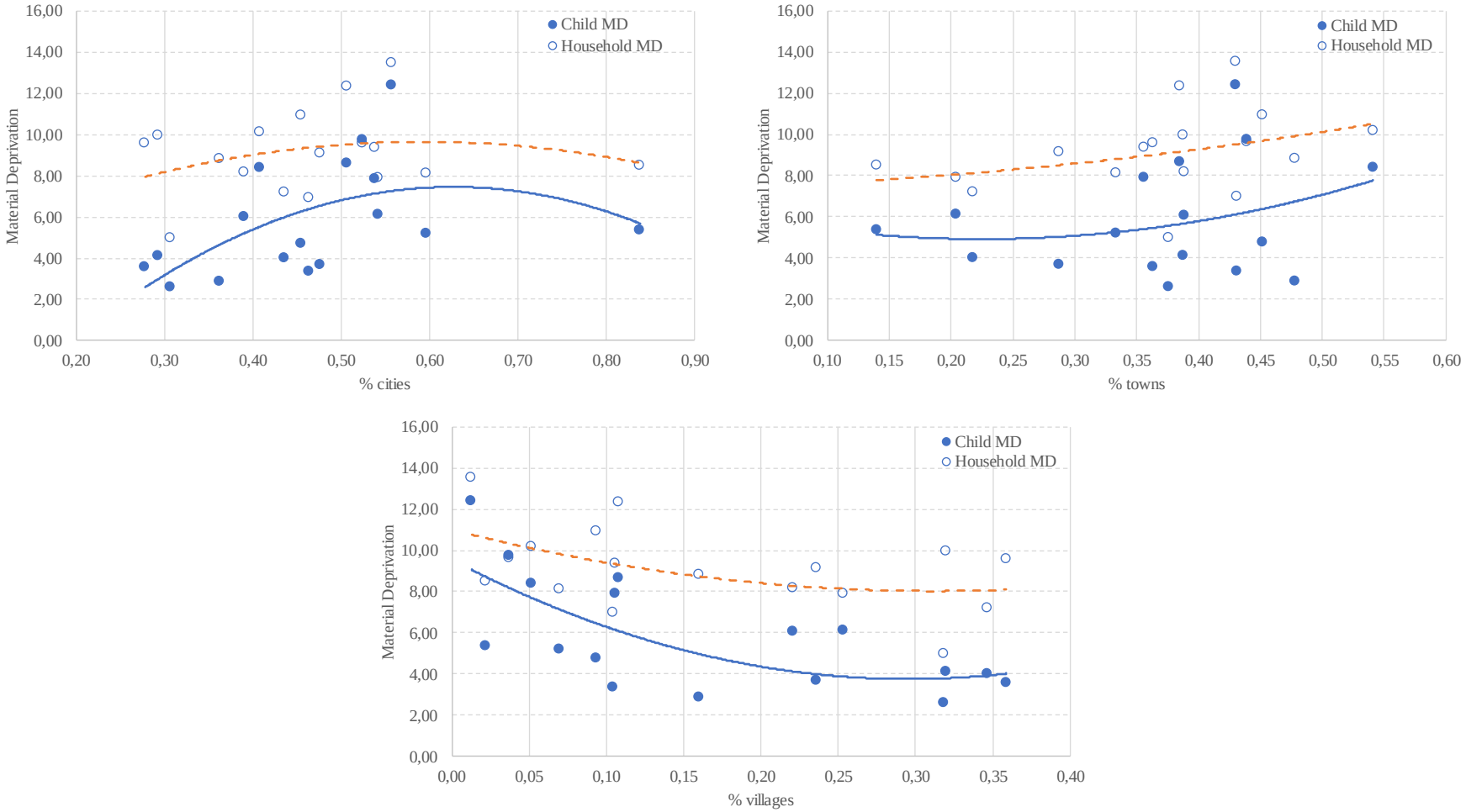


Panel B. Child material deprivation



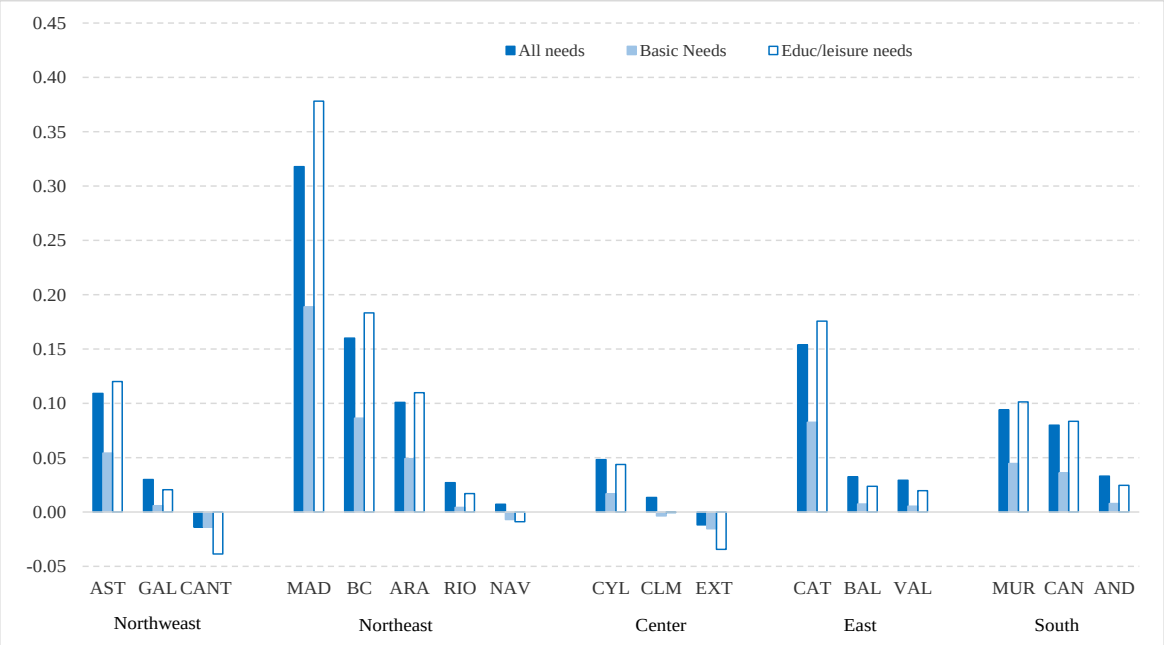
Source: Spanish National Statistics Institute (INE), EUROSTAT and own calculations.
Note: NUTS classification from EUROSTAT (levels 1 and 2): Andalusia (AND), Aragon (ARA), Asturias (AST), Balearic Islands (BAL), Canary Islands (CAN), Cantabria (CANT), Catalonia (CAT), Castile-La Mancha (CLM), Castile and Leon (CYL), Extremadura (EXT), Galicia (GAL), Madrid (MAD), Murcia (MUR), Navarre (NAV), Basque Country (BC), La Rioja (RIO), Valencia (VAL).

Figure 2. Degree of urbanization and material deprivation at regional level



Source: Spanish National Statistics Institute (INE), EUROSTAT and own calculations.

Figure 3. Size of the effect of living in a city by region



Source: Spanish National Statistics Institute (INE), EUROSTAT and own calculations
Note. NUTS classification from EUROSTAT (levels 1 and 2). See note in Figure 1