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Are social exclusion and poverty measures interrelated? A study with Spanish data

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One of the targets of Europe's growth strategy (Europe 2020) is "reduction of poverty by aiming to lift at least 20 million people out of the risk of poverty or social exclusion". Since poverty is a multidimensional concept, EUROSTAT proposes three indicators to calculate it: *people at risk-of-poverty after social transfers* (Persons are at risk of poverty if their equivalent disposable income is below the risk-of-poverty threshold, which is set at 60 % of the national median after social transfers); *severely materially deprived people* (Severely materially deprived persons have living conditions greatly constrained by a lack of resources and cannot afford at least four of the following: to pay rent or utility bills; to keep their home adequately warm; to pay unexpected expenses; to eat meat, fish or a protein equivalent every second day; a week holiday away from home; a car; a washing machine; a colour TV; or a telephone) and *people living in households with very low work intensity* (Persons are defined as living in households with very low work intensity if they are aged 0-59 and the working age members in the household worked less than 20 % of their potential during the past year.). We concentrate on the first two indicators and analyze the relationships between them using the Spanish Survey on Living Conditions 2010. Following EUROSTAT methodology we found that 2,590,148 Spanish households can be considered poor and 504,227 are deprived. But only 262,280 are, at the same time, poor and deprived. In order to improve deprivation index we substitute EUROSTAT methodology by Fuzzy method but results do not get better. Additionally, we test both deprivation indicators with households' income distribution (percentiles) and find very significant inconsistencies: some deprived families belong to the highest income percentiles and some variables used to work out the indexes have sample problems. The main conclusion of the article is that in order to calculate a poverty multidimensional index we should take into account that social exclusion variables and indexes have to be analyzed very carefully before using them to classify people as deprived, at least in the Spanish case.

Key words: deprivation, poverty, index

JEL code: I32

Deprivation and poverty are not the same, but their measurements should be interrelated, at least theoretically, since they try to indentify similar collectives and are joint objectives of social policies. That is the case of Europe's growth strategy (Europe 2020), where one of its main targets is "*reduction of poverty by aiming to lift at least 20 million people out of the risk of poverty or social exclusion*"[1].

Poverty has been typically approached using economic indicators. The European Commission considers that: "*people are said to be living in poverty if their income and resources are so inadequate as to preclude them from having a standard of living considered acceptable in the society in which they live. Because of their poverty they may experience multiple disadvantages through unemployment, low income, poor housing, inadequate health care and barriers to lifelong learning, culture, sport and recreation. They are often excluded and marginalized from participating in activities (economic, social and cultural) that are the norm for other people and their access to fundamental rights may be restricted*."[2] The main variable to measure it is income, and people are classified as poor if they do not overcome "poverty threshold", calculated as 60% of income per unit of equivalent consumption median. This is an indirect approach[3] -also called *input* based method-, since ***income allows achieving a certain level of wellbeing but does not guarantee it***.

On the other side, deprivation adopts a direct approach, focusing on *outcomes* and ***concentrating in real living conditions***. It is based on the idea that "*the final conditions of individuals can indeed differ between people with identical resources, depending on needs, health conditions, social networks or other personal constraints and abilities*"[4]. So, income would not be a good proxy to living conditions. Literature on deprivation come from pioneering studies of Townsend (1979) and Sen (1985), and it usually employs a combination of qualitative social indicators depicting material living conditions such as housing conditions, durable goods, capacities for afford basic requirements…

Both methods have advantages and disadvantages. EUROSTAT states that: "*while recognizing the limits of the monetary approach, we do not argue that deprivation measures provide a better approach, we emphasize the interest in comparing different complementary measures to deepen our understanding of poverty*"[5].

Many authors suggest that deprivation and poverty should be employed together to calculate a multidimensional social exclusion index. In fact, that is what Europe 2020

[1] http://epp.EUROSTAT.ec.europa.eu/portal/page/portal/europe_2020_indicators/headline_indicators
[2] European Commission, Joint Report on Social Inclusion 2004. http://www.poverty.org.uk/summary/eapn.shtml
[3] Ringen (1988)
[4] EUROSTAT (2009). Also see Halleröd et al. (2006) or Nolan & Whelan (2007).
[5] EUROSTAT (2009),page 1.

fifth objective proposes, making use of three indicators to calculate a multidimensional measure of poverty and social exclusion: *people at risk-of-poverty after social transfers*; *severely materially deprived people* and *people living in households with very low work intensity*.

People at risk-of-poverty after social transfers index measures the share of persons at risk of monetary poverty. A person is at that risk if his equivalent disposable income is below the risk-of-poverty threshold, which is set at 60 % of the national median after social transfers[6].

Severely materially deprived people are those who "*have living conditions greatly constrained by a lack of resources and cannot afford at least four of the following: to pay rent or utility bills; to keep their home adequately warm; to pay unexpected expenses; to eat meat, fish or a protein equivalent every second day; a week holiday away from home; a car; a washing machine; a colour TV; or a telephone*"[7].

Finally, persons are defined as *living in households with very low work intensity* if they are aged 0-59 and the working age members in the household worked less than 20 % of their potential during the past year.[8]

In this article we give attention to the first two indicators of Europe 2020 Strategy and compare the poor/deprived population obtained using them. The idea we want to test has widely been discussed in social exclusion literature without agreement: since both statistics focus on *people with difficulties to attain a decent life because of lack of income or lack of social standards,* accurate indicators should identify similar collectives. We use Spanish 2010 SILC (Survey on Living Conditions) data.

The article follows the present structure: in the next epigraph we discuss poverty methodology and how to calculate people at risk-of-poverty after social transfers using income; the second one is dedicated to deprivation methodology and the estimation of deprivation indicator from qualitative social variables; third epigraph discusses the relationship between poverty and deprivation; the fourth presents the results obtained; finally we conclude in the fifth epigraph.

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6 http://epp.EUROSTAT.ec.europa.eu/portal/page/portal/sdi/files/t2020_52_v0y_People%20at%20risk%20of%20poverty%20after%20social%20tran.pdf

7 http://epp.EUROSTAT.ec.europa.eu/portal/page/portal/sdi/files/qp%20Severely%20materially%20deprived%20people.pdf

8 http://epp.EUROSTAT.ec.europa.eu/portal/page/portal/sdi/files/qp%20People%20living%20in%20households%20with%20very%20low%20work%20intens.pdf

1. ***People at risk-of-poverty after social transfers***

There is a considerable literature relating poverty and monetary variables, even in the Spanish case[9]. Most recent studies use EUROSTAT methodology and define persons at risk of poverty as those whose equivalent disposable income is below the risk-of-poverty threshold, which is set at 60 % of the national median after social transfers.

In this article we apply the same methodological procedure to calculate *poverty line*. We select total family's income[10] and divide it by the number of members of the household using modified OECD equivalence scales. Its formula is:

$$e_h = 1 + 0{,}5(a_h - 1) + 0{,}3m_h$$

with e_h the equivalent scale; a_h the number of adults in *h* household older than 13 years; and m_h the number of children under 13 years.

Then we assign income per unit of equivalent consumption to all household members and calculate *individual poverty line* as 60 per cent of national median. Therefore, those people whose income per unit of equivalent consumption is under 60 per cent of the distributional median are classified as poor.

Afterwards, we multiply poverty line by OECD equivalence scales to obtain different poverty thresholds depending on household composition. Finally, we compare household income to poverty line in its group. We consider poor households those under their respective poverty line.

Data come from the Survey on Income and Living Conditions (SILC) in 2010 (observations from 2009) conducted by the Spanish Statistics National Institute (INE). The unit of analysis is the household. It works with a sample of 13,597 observations representing 17,114,397 Spanish families. It is significant at regional level. Individual poverty line is set at 9,214.6€ per year. The main results are presented in Tables 1 and 2.

Table 1.- Poor versus non poor households population

Households	**Number**	**Percentage**
Non poor	14,524,248	84.9
Poor	**2,590,148**	**15.1**
TOTAL	17,114,397	100.0

Source: Drawn up by the authors from Spanish SILC 2010

[9] Calvo, Sánchez y Cortiña (2010a,b) resume the Spanish studies about poverty using income variables.
[10] Calvo, Martinez & Sánchez (2008, pp 107-116) describe the methodology to calculate total household income as well as income per unit of equivalent consumption.

Table 2.- Poverty line depending on household composition

Number of members	Poverty line
One	9,214.6
Two adults without children	13,821.91
One adult with a dependent child	11,978.99
One adult with two dependent children	14,743.37
Two adults with a dependent child	16,586.30
Two adults with two children	19,350.68
Two adults with three children	22,115.06

Source: Drawn up by the authors from Spanish SILC 2010

2. ***Severely materially deprived people***

The original sources of deprivation literature are the pioneering studies of Townsend (1979) and Sen (1985). Townsend focuses on people who lack necessities and activities to guarantee a *decent life* in the society they belong. He identifies a list of items (covering diet, clothing, shelter, environment, family activities…) and builds a scale of deprivation.

Sen (1985) develops the *capabilities approach*. Its core focus is on what individuals are able to do. He argues for five components in assessing capability, the fourth related to a balance of materialistic and nonmaterialistic factors in evaluating welfare, and the fifth one concerned for the distribution of opportunities within society. The basic idea is that people are different in some aspects, sometimes not observed but important to their welfare, and this concept includes multidimensional issues.

Other authors have made their contribution to deprivation/social exclusion literature. Bossert, D'Ambrosio y Peragine (2007) include social phenomena as different as poverty, deprivation, low educational level, unemployment, house conditions and the lack of access to political and social institutions to estimate social exclusion. Chakravarty & D'Ambrosio (2006) and Poggi(2007) work in the same direction. Bastos, Fernandes & Passos (2004:1053) define child deprivation "*if he/she does not have a consumption pattern generally accepted (is disadvantaged in economic, social and interpersonal terms)*". Dominguez & Núñez (2010) employ housing conditions, capacities for afford basic requirements and neighborhood environment to study social exclusion in Spanish households with handicapped members…

Two main questions arise when calculating multidimensional deprivation indicators: which variables should be selected to identify a deprived household; and how aggregating them, since they usually are qualitative.

European Union formed an international experts group, headed by Prof. Atkinson, to propose social exclusion indicators[11]. Those selected were approved in Laeken Conceal in December 2001[12]. Finally, Europe's growth strategy (Europe 2020) agreed in nine variables –included in European SILCs- to obtain a *severely materially deprived people* indicator: the capability to pay rent or utility bills; to keep home adequately warm; to pay unexpected expenses; to eat meat, fish or a protein equivalent every second day; to spend a week holiday away from home; to have a car; a washing machine; a colour TV; or a telephone.

The second question has to do with aggregation. Ayllón, Mercader & Ramos (2007) differentiate two ways: attributes (variables) and individuals. So, it has to be decided if it is preferred to combine attributes for each person to reach an individual indicator and afterwards aggregate over individuals to obtain a global deprivation index or, on the contrary, it should aggregate individuals and calculate an indicator for each attribute and next aggregate the indicators to reach a general index. We opt for the first option.

In order to find first-class deprivation indicators we utilize EUROSTAT methodology. Then, severely materially deprived people are those who ***cannot afford at least four of the following***:

1. to pay rent or utility bills
2. to keep their home adequately warm
3. to pay unexpected expenses
4. to eat meat, fish or a protein equivalent every second day
5. a week holiday away from home
6. to have a car
7. to have a washing machine
8. to have a colour TV
9. to have a telephone

We employ Spanish SILC (2010) and obtain that 504,227 families can be considered deprived. This amount only represents 3% of Spanish households.

[11] Basic criteria employed to select those indicators are included in Atkinson, Cantillon, Marlier & Nolan (2002)

[12] Nevertheless, as Ayala (2006) points out: "*…there are many limitations, the most relevant related to the lack of fundamental social exclusion dimensions such as housing, immigration or the access to other basic goods associated with social welfare*"

Since the results using EUROSTAT criteria are really poor we attempt another procedure. We apply the same method used by Domínguez & Núñez (2010) and Bastos & Machado (2009) and make use of fuzzy theory to calculate a deprivation multidimensional indicator.

To be able to compare the outcome of this new approach to EUROSTAT's results we use the same nine variables described in previous paragraph. Since they are dichotomous we consider the household deprived if the answer to the variable is not (not able to pay rent or utility bills… or not have car…) and no deprived if it can afford it. This simplifies Cheli & Lemi (1995)'s Totally Fuzzy and Relative Theory.

We take into account the nine variables $\alpha = [\alpha_1 \ldots \alpha_{k=9}]$ and define α_{ik} *(k attribute referred to household i)* as:

$$\alpha_{ik} = \begin{cases} 1 & the\ household\ is\ deprived \\ 0 & the\ household\ is\ not\ deprived \end{cases}$$

For every household we define its deprivation scale as $\mu_j\ (i) \epsilon [0,1]$. If $\mu_j\ (i)=1$ the ith family is completely deprived (all the variables take value 1) and if $\mu_j\ (i)=0$ there is no deprivation at all (all the attributes take value 0).

There are two ways to obtain deprivation membership function: considering all the attributes have the same relevance or not. We adopt the last position and suppose the attributes do not weight the same. Following this criterion we compute the ith household deprivation scale as:

$$\mu_j(i) = \frac{\sum_{k=1}^{9} \alpha_k \ w_j}{\sum_{k=1}^{9} w_j}$$

Where w_j is the weight of attribute *j* calculated as:

$$w_j = \log\left(\frac{1}{relative\ frequency = f_j}\right)$$

f_j = number of deprived families divided by total number of households. Therefore, $\mu_j\ (i)$ can be expressed as:

$$\mu_j(i) = \frac{\sum_{k=1}^{9} \alpha_k \ \log\left({}^{1}/_{f_j}\right)}{\sum_{k=1}^{9} \log\left({}^{1}/_{f_j}\right)}$$

Finally, we follow Bastos & Machado (2009) methodology and set the deprivation threshold at 140% of the median. To estimate the median we only take into account households with deprivation scales bigger than 0.

A resume of Spanish deprivation families' estimation obtained by both methods is presented in Table 3.

Table 3.- Estimation of deprived families using EUROSTAT and Fuzzy method

	Deprived	Percentage	Non deprived	Percentage	Total
EUROSTAT	504,227	3.0	16,610,170	97.0	17,114,397
Fuzzy method	2,574,293	15.0	14,540,104	84.9	17,114,397

Source: Drawn up by the authors from Spanish SILC 2010

3. ***The relationship between poverty and deprivation***

The relationship between poverty and deprivation is a controversial issue. Some authors such as Wilson (1987) or Bastos, Fernandes & Passos (2004) consider poverty the major determinant of deprivation. This idea is also supported by Massey, Gross & Shibuya (1994) when they declare "*…the intense clustering of poor people in neighbourhoods leads to a concentration of other deleterious social and economic circumstances associated with poverty*"[13].

However, Townsend (1979, 1987), Sen (1995) or Room (1995) believe that a strong correlation between income poverty and deprivation cannot be established. Towsend (1979) argues that deprivation and poverty are two concepts that do not necessarily overlap, been economic poverty a component of deprivation and not its determinant. This author commented in 1987[14]: "*…people experiencing some forms of deprivation may not all have low income"*. The same position adopts Sen (1995) when affirms[15]: "*…the extent of deprivation may be under-judged if we concentrate only on the size of incomes"*.

In any case, there should be an association between deprivation and poverty since they try to capture similar collectives: *people with difficulties to attain a decent life*

[13] Page 426.
[14] Townsend (1987), page 131
[15] Sen (1995), page 113

because of lack of income or lack of social standards. So, we compare the results obtained in previous epigraphs. Table 4 presents this relationship using Spanish data.

Table 4.- Poverty versus deprivation (EUROSTAT and fuzzy index). Households

			MONETARY VARIABLE		
			Non poor	Poor	Total
QUALITATIVE VARIABLES	EUROSTAT	Non deprived	14282301	2327869	16610170
		Deprived	241948	**262280**	504227
		Total	14524248	2590148	17114397
	Fuzzy	Non deprived	12814392	1725712	14540104
		Deprived	1709856	**864437**	2574293
		Total	14524248	2590148	17114397

Source: Drawn up by the authors from Spanish SILC 2010

Only 52% of deprived households (EUROSTAT's methodology) are economically poor – they are under the 60% of income national median-; if we consider fuzzy method the percentage reduces to 33.4%. On the other side, around 10% of poor people – measured in economic terms- are deprived according to EUROSTAT, and the amount increases to 33.6% with fuzzy.

Therefore, we cannot affirm that poverty is a determinant of deprivation or vice versa.

4. *Income distribution and deprivation variables*

In order to find why deprivation and poverty are so unsuccessfully related in the Spanish case we analyze the distribution of EUROSTAT's nine deprivation indicators by deciles of income. The number of households in any percentile is included in Table 5. Meanwhile, Table 6 shows the distribution by deciles of income of those household considered deprived using the same nine indicators.

Table 5.- Distribution of EUROSTAT's nine indicators by income deciles (number of households)

		INCOME DECILES										
		10	20	30	40	50	60	70	80	90	100	Total
to pay rent or utility bills	Not deprived	1456021	1583615	1618986	1656443	1635091	1655385	1669779	1671308	1697920	1701826	16346374
	Deprived	256785	125968	93119	56950	72884	58104	41524	39491	15210	7989	768023
a week holiday away from home	Not deprived	592312	589013	665511	798457	888542	1008841	1243258	1369630	1561956	1600277	10317797
	Deprived	1120493	1120569	1046594	914936	819434	704647	468044	341169	151174	109538	6796600
To eat meat, fish or a protein equivalent every second day	Not deprived	1615166	1650447	1650736	1677592	1649941	1672183	1686836	1691428	1695159	1688901	16678389
	Deprived	97639	59135	61369	35801	58035	41306	24467	19371	17971	20915	436008
to pay unexpected expenses	Not deprived	654273	647798	757875	861021	1012668	1095577	1251505	1369597	1572905	1601847	10825068
	Deprived	1058533	1061784	954229	852372	695308	617911	459798	341202	140225	107968	6289329
To have telephone	Not deprived	1684772	1689661	1706318	1708464	1699375	1710339	1706517	1707700	1713130	1709815	17036091
	Deprived	28033	19922	5787	4929	8601	3150	4786	3099	0	0	78306
To have colour TV	Not deprived	1703483	1706176	1711578	1712121	1706655	1712820	1706069	1707494	1713130	1709815	17089341
	Deprived	9322	3407	527	1272	1321	668	5234	3305	0	0	25056
To have washing machine	Not deprived	1702878	1703901	1702562	1710092	1707195	1713488	1711302	1710662	1713130	1709293	17084503
	Deprived	9927	5681	9543	3301	781	0	0	138	0	522	29894
to have a car	Not deprived	1466822	1530306	1611685	1638648	1635073	1660396	1652228	1672940	1696012	1706005	16270115
	Deprived	245983	179276	100420	74745	72903	53093	59075	37859	17118	3811	844282
To keep their home adequately warm	Not deprived	1413334	1484706	1530920	1563171	1578835	1617338	1650632	1671722	1690207	1680660	15881526
	Deprived	299471	224876	181185	150222	129141	96150	60671	39077	22923	29155	1232870
EUROSTAT	Not deprived	1498264	1617729	1649593	1674648	1669097	1692529	1688391	1702080	1709773	1708063	16610170
	Deprived	214541	91853	62512	38745	38878	20959	22911	8719	3357	1753	504227

Fuzzy	Not deprived	1105335	1211440	1358242	1449841	1445926	1500461	1553406	1592502	1656350	1666602	14540104
	Deprived	607470	498143	353863	263552	262050	213028	157897	118297	56780	43214	2574293

Source: Drawn up by the authors from Spanish SILC 2010

Table 6.- EUROSTAT's nine indicators distribution of deprived households by income deciles (percentages)

	INCOME DECILES										OVER 50 (number)	OVER 50 (%)
	10	20	30	40	50	60	70	80	90	100		
to pay rent or utility bills	33,4	16,4	12,1	7,4	9,5	7,6	5,4	5,1	2,0	1,0	162318	21,1
a week holiday away from home	16,5	16,5	15,4	13,5	12,1	10,4	6,9	5,0	2,2	1,6	1774572	26,1
To eat meat, fish or a protein equivalent every second day	22,4	13,6	14,1	8,2	13,3	9,5	5,6	4,4	4,1	4,8	124030	28,4
to pay unexpected expenses	16,8	16,9	15,2	13,6	11,1	9,8	7,3	5,4	2,2	1,7	1667104	26,5
To have telephone	35,8	25,4	7,4	6,3	11,0	4,0	6,1	4,0	0,0	0,0	11035	14,1
To have colour TV	37,2	13,6	2,1	5,1	5,3	2,7	20,9	13,2	0,0	0,0	9207	36,7
To have washing machine	33,2	19,0	31,9	11,0	2,6	0,0	0,0	0,5	0,0	1,7	660	2,2
to have a car	29,1	21,2	11,9	8,9	8,6	6,3	7,0	4,5	2,0	0,5	170956	20,2
To keep their home adequately warm	24,3	18,2	14,7	12,2	10,5	7,8	4,9	3,2	1,9	2,4	247976	20,1
EUROSTAT	42,5	18,2	12,4	7,7	7,7	4,2	4,5	1,7	0,7	0,3	57699	11,4
Fuzzy	23,6	19,4	13,7	10,2	10,2	8,3	6,1	4,6	2,2	1,7	589215	22,9

Source: Drawn up by the authors from Spanish SILC 2010

The most remarkable results are shown in the last two columns of Table 6. They show the number and percentage of deprived households whose income rise above the 5th percentile (therefore, they are in the "rich" side of income distribution).

In this Table we observe that if we employ EUROSTAT's methodology then 11% of Spanish deprived households are in the five highest deciles of income distribution. And this percentage doubles when we apply fuzzy method. Considering each deprivation attribute we detect that 36% of those families without colour TV belong to this "high income" group; the percentage rises to almost 30% for those unable to eat meat, fish or a protein equivalent every second day; it is over 25% for families who cannot afford a week holiday away from home and to pay unexpected bills; finally, it is around to 20% for those with problems to pay rent or utility bills, are incapable to keep their home adequately warm or do not have car.

Some of this anomalous number of households belonging to the highest part of income allocation can be due to sample errors. Table 7 presents sample distribution by income deciles of EUROSTAT's nine attributes to categorize deprivation.

The data included in Table 7 show the inappropriateness of some of the attributes selected to approach deprivation in the Spanish case. Only 18 households in a sample of 13,597 observations (0.13%) do not have colour TV and 4 of them have an income high enough to belong to 60 to 100 percentiles; 29 do not have washing machine (0.21%), 2 of them in the highest deciles and 71 do not have telephone (7 in the group of deciles 60 to 100). Since the variables consist of subjective opinions on household situation, it is no impossible that those answers contain sample miscalculations.

Additionally, when we combine EUROSTAT methodology (to have problems in 4 attributes) with Table 7 sample distribution we find there are only 6 effective variables to be considered. That is why there are so few deprived families.

In the case of fuzzy method the problem is just the opposite: since those three variables (colour TV, washing machine and telephone) are so underrepresented in deprived sample, then their relevance (weight) in deprivation index is enormous.

Table 7.- EUROSTAT's nine indicators distribution of deprived households by income deciles (sample)

	INCOME PERCENTILES											>50
	10	20	30	40	50	60	70	80	90	100	Total	
to pay rent or utility bills	201	95	62	44	48	36	27	25	10	7	555	105
a week holiday away from home	935	954	832	724	602	534	351	246	120	78	5376	1329
To eat meat, fish or a protein equivalent every second day	89	52	49	27	32	24	17	11	10	10	321	72
to pay unexpected expenses	887	878	753	673	528	449	326	235	104	76	4909	1190
To have telephone	27	21	7	4	5	2	3	2	0	0	71	7
To have colour TV	7	4	1	1	1	1	2	1	0	0	18	4
To have washing machine	12	5	6	3	1	0	0	1	0	1	29	2
to have a car	197	133	81	52	46	37	31	31	10	4	622	113
To keep their home adequately warm	240	207	157	124	91	75	48	30	19	19	1010	191

Source: Drawn up by the authors from Spanish SILC 2010

5. *Conclusions*

Two kinds of variables have usually been used to measure social exclusion: poverty, approached by monetary variables such as income; and deprivation, employing qualitative variables. They are not exclusive, and many authors and Europe 2020 Strategy combine them to obtain a multidimensional index.

In fact, there should be an association between deprivation variables and poverty measures since they are used to identify similar collectives: *people with difficulties to attain a decent life because of lack of income or lack of social standards*. Most authors have suggested this association, some of them considering poverty as the determinant factor of deprivation.

We have used Spanish SILC 2010 to analyze if this relationship between economic poverty and social deprivation exists in Spain. We define poverty threshold as 60% of national income per unit of equivalent consumption mean. And we employ EUROSTAT's nine qualitative attributes to proxy deprivation. In fact we apply two methods to define deprived households: EUROSTAT's methodology (4 of 9 indicators) and fuzzy method with weighted variables.

The results do not confirm the relationship between monetary poverty and qualitative deprivation. Only 52% of deprived households (EUROSTAT's methodology) are economically poor; and the percentage reduces to 33.4% if we employ fuzzy method. If we look to the other side, around 10% of poor people are deprived according to EUROSTAT, and the amount increases to 33.6% with fuzzy.

In the last epigraph we have crossed EUROSTAT's deprivation attributes with income distribution (percentiles). The results show important inconsistencies. Using EUROSTAT's methodology we observe that 11% of Spanish deprived households are located in the highest deciles of income distribution. And this percentage doubles when we apply fuzzy method. Considering each deprivation attribute we detect that 36% of families without colour TV belong to this "high income" group; the percentage rises to almost 30% for those unable to eat meat, fish or a protein equivalent every second day; it is over 25% for families who cannot afford a week holiday away from home and to pay unexpected bills and it is around to 20% for those with problems to pay rent or utility bills, are incapable to keep their home adequately warm or do not have car.

In order to explain those discrepancies we analyse sample distribution and find that household's declared deprivation is inconsistent with the main objective of deprivation analysis because of subjectivity of answers or sample errors. Additionally, there is insufficient number of observations in some attributes used to qualify deprivation.

Our recommendation is to reconsider deprivation attributes and to take account of others with more household's objective characteristics. Some of the variables included in the Spanish study are not significant to calculate deprivation (colour TV, telephone, washing machine or car) and could give way to misconstrued indexes.

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