The interrelationships between the Europe 2020 poverty and social exclusion indicators

Sara Ayllón [1]   András Gábos [2]

[1]Department of Economics, University of Girona & EQUALITAS

[2]TÁRKI Social Research Institute

SASE conference
London, 2-4 July 2015

Introduction

- The paper was produced within the frame of the ImPRovE - Poverty reduction in Europe: Social Policy and Social Innovation project funded under the 7th Framework Programme of the European Union.

- In line with the EU2020 strategy for a smart, sustainable and inclusive growth, the European Union adopted in 2010 a set of headline targets.

- In relation to poverty reduction, the target aimed at reducing the number of people living in poverty and social exclusion by 20 million in 2020. Unfortunately, recent data indicates that the EU is moving away from that target: the number of people affected moved from 114 to 124 million between 2009 and 2012 (European Commission, 2014).

- As widely known, the measure of the fight against poverty and social exclusion headline target is composed of three indicators:

  ▶ At-risk-of poverty (AROP)
  ▶ Severe material deprivation (SMD)
  ▶ Low work intensity (LWI)

Introduction

- With the headline target set, the European Commission has started to monitor the Member States' advancement towards it by using a dashboard approach. All the analytical tools focus on outcomes and rely on the most recent **cross-sectional data**.

- However, from a policy point of view, it is also important to assess the dynamic interrelationship between poverty, severe material deprivation and low work intensity based on **longitudinal data**.

- Policy interventions need to be based on a better understanding of the possible spill-over effects between the three phenomena over time.

- Thus, the aim of this paper is to dynamically analyse the interrelationships between the three segments of poverty and social exclusion covered by the EU2020 poverty target:
  - What's the degree of genuine state dependence?
  - Is there feedback effects between the three indicators?

Literature review

Literature has established the existence of a considerable amount of **genuine state dependence** in each of the processes measured by the composite indicator. Being in a state *causally* increases the probability of being in the same state again in the future:

- In the case of **poverty**, the literature is vast. Problems of demoralization, loss of motivation, the stigma associated with social assistance receipt or the depreciation of human capital may explain poverty state dependence (Cappellari and Jenkins, 2004; Biewen, 2009; Devicienti and Poggi, 2011; Fusco and Islam, 2012 or Ayllón, 2013).

- Evidence for state dependence in **material deprivation** is scarce (Guio and Thévenot, 2014).

- In the case of **low work intensity**, state dependence is well-documented at the individual level (Arulampalam et *al.*, 2000; Biewen and Steffes, 2010; Knights et *al.*, 2002). At the household level, Ward and Özdemir (2013) have found a relationship between the proportion of individuals that live in a LWI household and the proportion of households with persistent LWI.

Literature review

As for **feedback effects** (from the past on the present):

- **Poverty ↔ Material deprivation**: Previous findings do not seem to have reached a strong consensus in favour or against a correlation between both phenomena over time. Part of the literature agrees on a positive relationship (Devicenti and Poggi, 2011; Berthoud and Bryan, 2011). Others have found no evidence (Muffels and Fouarge, 2004; Dewilde, 2004).

- **Poverty ↔ Low work intensity**: Literature on the relationship between employment and poverty is vast. However, works that precisely account for the feedback effect from poverty to employment opportunities (and reversely) are not so many (Amuedo-Dorantes and Serrano-Padial, 2010; Biewen, 2009 and Ayllón, 2014a)

- **Material deprivation ↔ Low work intensity**: As far as we know, it has not been studied.

Data and definitions

- Data is from the European Union - Survey on Income and Living Conditions (EU-SILC), 2004-2010.

- Individuals between the ages of 16 and 59.

- In most countries, the longitudinal component is derived from a rotating panel sample with four replications.

- In order to guarantee that the same methodology is applied longitudinally to each rotational group, we have built our panel by taking the information from the last file in which a given rotational group is in.

- As for the three EU2020 indicators:
  - ▶ At-risk-of poverty: Below 60% of median equivalised income (modified OECD equiavalence scale).
  - ▶ Severe material deprivation: Inability to pay for at least 4 out of 9 possible items (meat or proteins regularly, unexpected expenses, a washing machine, etc.)
  - ▶ Low work intensity: If aged 0-59 and the working-age members in the household worked less than 20% of their potential during the past year.

Data and definitions

There are several caveats that one needs to bear in mind in analysis that use data from the EU-SILC:

- The data is not based on a standardised questionnaire.

- It only refers to private households.

- There is a difference in the reference period for the three sub-indicators of the composite indicator: poverty and low work intensity refer to the *preceding* year and material deprivation refers to the *survey* year. We did not correct for it but,

  ▸ Some of the individual items of the material deprivation indicator also refer or may be suspect of referring to the preceding year (e.g. arrears).

  ▸ We would loose one year per household which means that we would have three observations in total and we could (at the most) model two transitions —which could (possibly) jeopardise our econometric strategy.
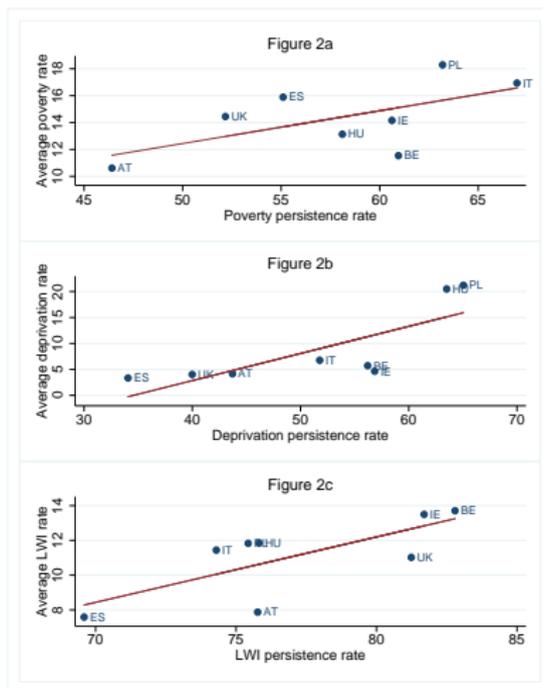
Description: extent, dynamics and interrelationships

Figure: Average rates for income poverty, severe material deprivation and low work intensity, 2003-2010
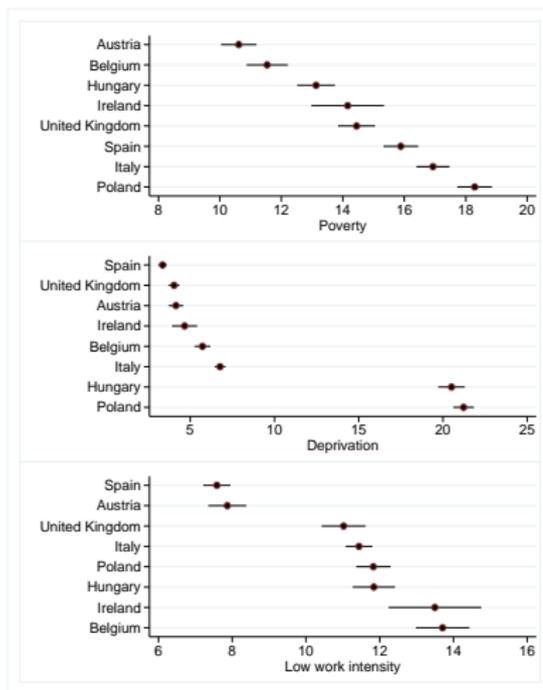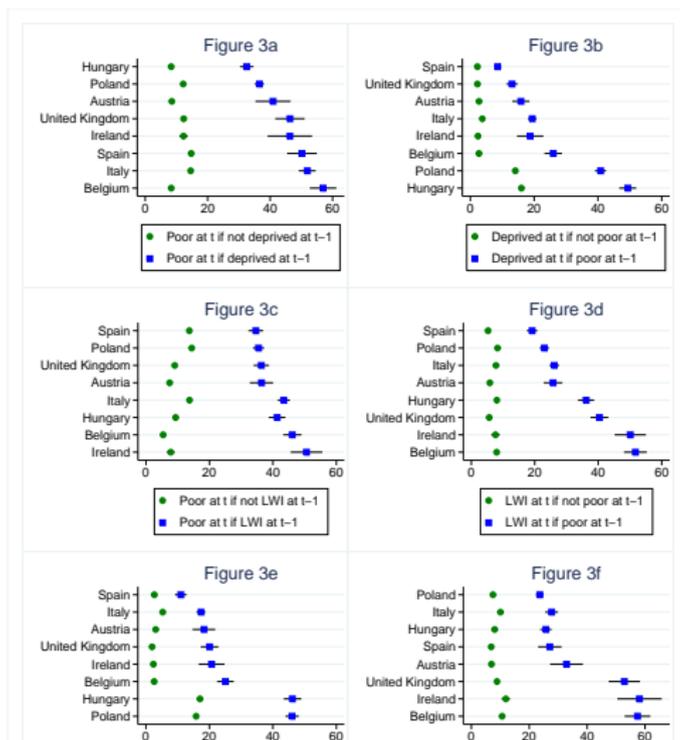
Description: extent, dynamics and interrelationships

Figure: Poverty risk and persistence rates by country

Description: extent, dynamics and interrelationships

Figure: Conditional entry rates by country

Econometric strategy

Our results are the outcome of a first-order Markov chain random-effects trivariate probit model:

$$p_{it}^* = \beta_0 D_{it} + \beta_1 W_{it} + \beta_2 P_{it-1} + \beta_3 D_{it-1} + \beta_4 W_{it-1} + \beta_5 Z_{it}^{'} + c_i + u_{it} \qquad (1)$$

$$d_{it}^* = \alpha_0 W_{it} + \alpha_1 P_{it-1} + \alpha_2 D_{it-1} + \alpha_3 W_{it-1} + \alpha_4 S_{it}^{'} + h_i + \epsilon_{it} \qquad (2)$$

$$w_{it}^* = \gamma_0 P_{it-1} + \gamma_1 D_{it-1} + \gamma_2 W_{it-1} + \gamma_3 V_{it}^{'} + g_i + \lambda_{it} \qquad (3)$$

$$P_{it} = I(p_{it}^* > 0) \qquad (4)$$

$$D_{it} = I(d_{it}^* > 0) \qquad (5)$$

$$W_{it} = I(w_{it}^* > 0) \qquad (6)$$

where $i = 1, 2, ..., N$ refers to individuals and $t = 1, ..., T$ are the number of transitions under study (at maximum three).

Econometric strategy

Other aspects:

- In the modelling, it is important to take into account the well-known problem of *initial conditions* (IC). Ignoring this endogeneity would not only lead to inconsistent estimators but to overestimation of the state dependence effect.

- We follow Wooldridge (2005) on the treatment of IC: we find the density of the dependent variables from $t = 1, ..., T$ conditional on the initial condition and the explanatory variables —instead of finding the density for the whole period $t = 0, 1, ..., T$ given the explanatory variables.

- Formally, we can write the specification as follows,

$$c_i = a_0 + a_1 P_{i0} + a_2 D_{i0} + a_3 W_{i0} + a_4 \overline{Z_i} + \kappa_{1i} \qquad (7)$$

$$h_i = b_0 + b_1 P_{i0} + b_2 D_{i0} + b_3 W_{i0} + b_4 \overline{S_i} + \kappa_{2i} \qquad (8)$$

$$g_i = x_0 + x_1 P_{i0} + x_2 D_{i0} + x_3 W_{i0} + x_4 \overline{V_i} + \kappa_{3i} \qquad (9)$$

Econometric strategy

- As explained by Wooldridge (2000, 2005) and in order to get consistent estimates, the residuals κ_{1i}, κ_{2i}, κ_{3i} are integrated out using a numerical integration algorithm based on Gauss-Hermite quadrature at 12 points. A trivariate normal distribution with zero mean and $\sigma^2_{k_{ji}}$ variance is assumed for κ_{1i}, κ_{2i}, κ_{3i} which are allowed to be freely correlated:

$$\rho_{12} = corr(\kappa_{1i}, \kappa_{2i}) \tag{10}$$

$$\rho_{13} = corr(\kappa_{1i}, \kappa_{3i}) \tag{11}$$

$$\rho_{23} = corr(\kappa_{2i}, \kappa_{3i}) \tag{12}$$

where, for example, ρ_{12} summarises the association between unobservable individual factors determining poverty status and material deprivation.

- The model has been estimated using the software package aML (see Ayllón, 2014b).

Empirical results

Table: Genuine state dependence estimates

	UK	Austria	Spain	Hungary
Poverty equation				
P_{it-1}	0.68***	0.77***	0.43***	0.57***
Severe material deprivation equation				
D_{it-1}	0.39***	0.46***	0.41***	0.75***
Low work intensity equation				
W_{it-1}	1.00***	1.73***	1.06***	1.44***

Genuine state dependence is found for the three processes in all countries —being stronger in the case of poverty and low work intensity. Any of the processes has a *scarring* effect on future probabilities of the same process.

Empirical results

Table: The interrelationship between poverty and severe material deprivation

	UK	Austria	Spain	Hungary
Poverty equation				
D_{it}	-0.04	0.18*	0.35***	0.22***
D_{it-1}	-0.09	0.08	0.19***	0.22***
Severe material deprivation equation				
P_{it-1}	0.21*	0.23***	0.01	0.12**

For the great majority of countries, feedback effects between poverty and severe material deprivation are not significant (especially in Continental and English-speaking countries). Stronger relationship was found in Spain and a feedback loop between the two was estomated in the Central-Eastern European countries. Both phenomena are most related via current effects, initial conditions and unobserved heterogeneity.

Empirical results

Table: The interrelationship between poverty and low work intensity

	UK	Austria	Spain	Hungary
Poverty equation				
W_{it}	0.56***	0.98***	0.70***	0.87***
W_{it-1}	-0.09	-0.01	-0.10**	-0.03
Low work intensity equation				
P_{it-1}	0.42***	0.13*	0.06	0.14**

Weak evidence for a positive influence of past poverty on LWI. Weak (if any) effect of past LWI on current poverty —except in Italy, while negative estimates for Spain and Poland. Instead, "current" low work intensity has a positive effect on "current" poverty in all countries at 99% confidence level.

Empirical results

Table: The interrelationship between material deprivation and low work intensity

	UK	Austria	Spain	Hungary
Severe material deprivation equation				
W_{it}	0.38**	0.18	0.13	0.12*
W_{it-1}	-0.25**	0.18	0.06	0.17***
Low work intensity equation				
D_{it-1}	0.27**	0.13	0.17**	0.24***

Mixed evidence for a positive influence of past material deprivation on LWI (positive in 5 out of 8 countries and negative in Italy). A positive effect of past LWI on current material deprivation is only found in Hungary and Poland (negative in the UK). Once more, if any, "current" low work intensity has a positive effect on "current" material deprivation —not highly significant.

Empirical results

Table: Unobserved heterogeneity and RE correlations

	UK	Austria	Spain	Hungary
σ_1	0.61***	0.70***	0.86***	0.75***
σ_2	0.79***	0.82***	0.83***	0.71***
σ_3	0.82***	0.61***	0.96***	0.57***
ρ_{κ_1,κ_2}	0.39**	0.55***	0.24***	0.21***
ρ_{κ_1,κ_3}	0.33***	0.21	0.39***	0.27***
ρ_{κ_2,κ_3}	0.20	0.35**	0.25***	0.12

The standard deviation of RE is highly significant in each equation which informs that accounting for unobserved heterogeneity is very important and pointing to the need for a joint model of the type presented.

Conclusions

- We have found that the three processes under study are affected by a considerable degree of genuine state dependence by which, the past influences *by itself* the probabllity of experiencing the same problem again in the future.

- It means that social policy in a given point in time will have spill-over effects in the future thus fighting against economic hardship *today*, clearly reduces the problem *tomorrow*.

- Poverty and material deprivation are different concepts: they are affected by current effects, initial conditions and correlated unobservables.
  - Weak association between poverty and material deprivation in affluent MSs.
  - But a clear evidence of a feedback loop between poverty and material deprivation was found in the Central-Eastern European countries.

- Current low work intensity status affects both poverty and material deprivation, no significant feedback loops were estimated - with the exception of Central-Eastern European countries.

The interrelationships between the Europe 2020 poverty and social exclusion indicators

Sara Ayllón [1]   András Gábos [2]

[1]Department of Economics, University of Girona & EQUALITAS

[2]TÁRKI Social Research Institute

SASE conference
London, 2-4 July 2015