

**Children in jobless households across Europe:
Evidence on the association with medium- and long-term outcomes**

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Abstract

The proportion of children living in a jobless household is a key indicator of social exclusion across Europe. Yet there is little evidence on the extent to which this measure of childhood deprivation is associated with later life outcomes. We use two harmonised cross-national data sources to consider the association between children experiencing jobless households and three medium- and long- term outcomes for the first time: education, adult joblessness and adult poverty. We find evidence of large penalties across all three outcomes in some countries while in other countries there are no longer-term associations with this indicator of social exclusion.

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1. Introduction

Previously, in the era of the male breadwinner, the male employment rate gave a good indication of the proportion of households without an employed member. However, since the 1980s there have been growing differences between individual and household-level joblessness both within and across countries (Gregg and Wadsworth, 1996, 1998, 2008; Corluy and Vandebroucke, 2015; O’Rourke, 2016; Gregg et al., 2010; Corluy and Vandebroucke, 2013; OECD, 1998). This diversion can be summarised by an increasing proportion of households without an earner during the 1980s and 1990s, despite individual level employment rates remaining stable over this period. This reflected both changes in family structure and employment polarisation at the household level, with increasing numbers of dual earner and no earner households.

From 2000, the proportion of people living in a jobless household became a key indicator of poverty and social exclusion used by the European Union. Since 2005, this measure has been extended to consider the proportion of children (0-17 year-olds) living in such households. Eurostat, the statistical agency that collects these data, state that experiencing a jobless household during childhood ‘*increases the risk of intergenerational transmission of poverty*’. This is due to the likely impact upon children’s access to health, housing, education, justice and other private services such as culture, sport and leisure, as well as a lack of role models (Eurostat, 2005). Recent figures show that Belgium, Ireland and the UK all had high rates of children in jobless households in 2015, Finland, Netherlands and Portugal had the lowest rates, while Spain and Greece have experienced large increases since the Great Recession (Eurostat, 2015).¹

Such experience of living in a jobless household during childhood can be viewed as a marker of disadvantage, with potential long-term effects upon children. Yet the evidence for such adverse outcomes has been limited to date². Primarily, work on children in jobless households has considered contemporaneous outcomes such as poverty (Corluy and Vandebroucke, 2015; Gradin et al., 2014; Nickell, 2004) and, to a lesser extent, early child outcomes such as wellbeing (Pedersen et al., 2005) and measures of cognition and behavioural issues (Schoon et al., 2012). There has also been a limited number of studies considering outcomes later in

¹ <http://ec.europa.eu/eurostat/web/products-datasets/-/tps00181> accessed 29/10/16, 13.05.

² A related literature has considered the impact of parental job loss on children’s outcomes in a single national setting (Rege et al., 2007; Stevens and Schaller, 2011; Gregg et al., 2012).

childhood and into adulthood (Schoon, 2014; McLanahan and Sandefur, 1994). The first objective of this paper is to provide new evidence across European countries on the extent of the association between experiencing a jobless household in childhood and three medium to long-term outcomes: education, adult employment and adult poverty.

In doing so, it explores the intergenerational transmission of disadvantage across countries for the first time, where parental joblessness in childhood acts as a marker of childhood disadvantage. Research on intergenerational transmissions has a long history, including work by sociologists on intergenerational class mobility since the 1960s (Blau and Duncan, 1967; Erikson and Goldthorpe, 2011) and more recently, by economists on the intergenerational persistence of income (Solon, 1999; Chetty et al., 2014; Jäntti et al., 2006; Gregg et al., 2016). Almost all of these studies consider average intergenerational associations for employed individuals. There have been far fewer studies focusing upon the association of deprivation or disadvantage across generations³, particularly with respect to the relationship between children's experiences of jobless households and longer-term adult outcomes, and how this varies across countries⁴. This paper attempts to make this contribution to the evidence base⁵.

Models of intergenerational transmissions put human capital at the forefront of mechanisms that drive associations across generations (Becker and Tomes, 1986; Solon, 2004; Duncan and Hodge, 1963). The relationship between parental socio-economic status and children's educational attainment is therefore central to intergenerational associations (Blanden et al., 2007). The literature also points to several other possible channels that could be driving intergenerational associations. Joblessness specifically could be causally transmitted from one generation to the next through the diminished resources associated with being out of work (Levine and Zimmerman, 1996); through a lack of social capital or informal social networks to aid job search (Corak and Piraino, 2008); and through the associated stress and depression from spells out of work (Conger et. al, 2000). Although deciphering between these channels is

³ Macmillan 2014; Shildrick et al. 2012; Blanden and Gibbons 2006; Corak, 2004 are some notable exceptions

⁴ A recent paper by Berloff et al., 2017 examines intergenerational worklessness across European countries focusing on gender differences between mothers and fathers and sons and daughters. Unlike our analysis which focuses on individual countries, this paper groups European countries into five categories. In addition, they do not explicitly examine the role of human capital in this process.

⁵ This feeds into a large related literature on the intergenerational persistence of education, social class and incomes (Blau and Duncan, 1967; Erikson and Goldthorpe, 2011; Solon, 1999; Chetty et al., 2014; Jäntti et al., 2006; and Gregg et al., 2016). This literature is predominantly assessing persistence for all members of society rather than having a specific focus on the intergenerational persistence of disadvantage. There is a more limited literature on intergenerational worklessness (Macmillan, 2014, Shildrick et al., 2012) and intergenerational poverty (Blanden and Gibbons 2006; Corak 2004; Jenkins and Seidler 2007), with most existing work having been conducted within a single national context.

beyond the scope of this research, the association between experiencing a jobless household and children's educational attainment is explored explicitly and is informative, both directly in terms of the educational penalties associated with growing up in a jobless household, and indirectly in terms of the future consequences for later outcomes.

Our analysis is based upon two harmonised data sources: the Programme for International Student Attainment (PISA) from 2012 and the European Survey of Income and Living Conditions (EU-SILC) from 2011. Whilst our focus on experiencing a jobless household in adolescence captures only one element of disadvantage in childhood, albeit a prominent measure of social exclusion, the data has other advantages. In particular, by using harmonised data, our key variables are defined and measured in the same way across countries. This is key to our goal of providing the first piece of international comparative evidence on this issue.

We make considerable efforts to validate the data on childhood exposure to parental joblessness across both data sources through comparisons with contemporaneous data from national labour force studies. We also use both data sources to cross-validate the strength of our evidence across outcomes. Specifically, we ask whether countries with higher associations of joblessness across generations, and greater associations between parental joblessness in childhood and adult poverty, also have stronger associations between parental joblessness in childhood and education. If there is an association between countries across two separate data sources and three different outcomes, this offers compelling evidence that some countries have more severe longer-term penalties associated with experiencing a jobless household in childhood than others. Critically, such a result would also indicate that a key Eurostat measure of social exclusion has different implications within different European settings.

Note our aim is not to provide causal evidence on transmissions across generations. Our methodology, as is commonly the case in both intergenerational and international comparative studies, limits us to discussions of associations only. Yet, we aim to offer the first robust evidence on the link between experiencing a jobless household in childhood and medium- and longer-term outcomes across a range of countries. We argue that there is significant value in trying to better understand how such intergenerational associations vary across countries, before attempting to understand why.

We find significant differences between countries in the extent to which they produce associations between parental joblessness in childhood and adult joblessness, poverty, and education. Belgium, Ireland and the UK stand out as countries with consistently strong

associations across all three domains. France and Italy follow these countries in having widespread evidence of adult disadvantage being associated with being a teenager in a jobless household. The Netherlands, Denmark and Finland are at the other extreme, with less adverse outcomes. Germany unusually shows among the worst outcomes for men but not women.

Across countries we find a marked correlation for males ($\rho = -0.47$) between intergenerational joblessness in the EU-SILC and lower educational outcomes of those living in jobless households in their teens in PISA. Similarly, when focusing on poverty as the adult outcome, a more moderate correlation is again found for males ($\rho = -0.39$). For women, the evidence of experiencing a jobless household as a teenager across multiple domains of adult disadvantage in the same countries is less marked. We discuss potential explanations for this finding, including the greater variety of options open to women on leaving full time education.

The paper now proceeds as follows. Section 2 describes the data and our empirical methodology. We present our main results in section 3, with conclusions and suggested directions for future research following in section 4.

2. Empirical Methodology and Data

The two main data sources used in this analysis are the Programme for International Student Attainment (PISA) from 2012 and the European Survey of Income and Living Conditions (EU-SILC) from 2011. We measure the association between experiencing a jobless household at 15 and educational achievement using PISA. We then use the EU-SILC to measure: (i) intergenerational joblessness (the association between living in a jobless household at 14 and adult joblessness) and (ii) the association between living in a jobless household at 14 and adult poverty. Finally, we consider the association between the EU-SILC and PISA results. Our empirical approach therefore proceeds in the three stages described below. Although these two data sources cover a wide range of countries, we focus upon the 24 European nations common to both.

Stage 1: PISA analysis

In the first stage of our analysis, we estimate a set of intergenerational models using data from PISA 2012, an international survey of 15-year-olds' educational achievement. The dependent variable is the survey respondent's educational achievement at age 15, as measured by their PISA mathematics scores. These estimates are from the following OLS regression model:

$$ed_{i,t,k} = \alpha_k + \gamma_k w_{i,t-1,k} + C_{itk} + e_{itk} \nabla K, \quad (1)$$

Where:

$ed_{i,t,k}$ = The PISA mathematics test scores of children

$w_{i,t,k}$ = Whether the child experienced a jobless household at age 15.

C_{itk} = Controls for immigration status⁶

ε_{itk} is an error term.

i = Individual

t = Refers to the *second* generation (and t-1 to the first generation)

∇K = Denotes that all models are estimated separately for each country.

The focus of this paper is upon the estimated γ_k parameter, capturing the strength of the association between household joblessness and children's educational achievement.

Each child participating in PISA completes a background questionnaire, including questions about their family and home situation. Pupils are asked if their parents are working part time, working full time, not working, but looking for a job or not working (e.g. retired or home duties). We combine the categories of 'not working, but looking for a job' with 'not working' and 'working part time' with 'working full time'. Pupils also answer questions about whether or not their parents are present in the household. The household is defined as jobless if (a) the child lives with both parents and both are out of work, or (b) the child lives with one parent and that specific parent is out of work. Note that the question regarding work in PISA is based on a single point in time. This may attenuate our estimates of the association between workless households and educational attainment, although may not affect country rankings if the bias is similar across countries. Final sample sizes for each country are presented in Table 1.

Table 1 here

There is a fair amount of variation across countries in terms of lone parent households (see Panel A of Appendix Figure A1), and these households have a higher risk of being categorised as jobless based on this measure as it only takes one jobless parent to create a jobless household compared to both in a two-parent family. The literature on jobless households explicitly

⁶ We do not know the age of the parents of PISA participants; however, they all have a 15-year-old child, which makes life cycle issues less of a concern. The intergenerational literature generally limits the use of control variables to only those that might affect the measurement of the associations.

considers the role of different family structures in explaining the differential rates of jobless households across countries and finds that this is a second-order issue, with differences in polarisation of employment driving the majority of the differences across countries (Gregg et al., 2010; Corluy and Vanderbroucke, 2013). Here, for space reasons, we do not explicitly draw out the picture for lone parent families separately, but they are included in the sample as a whole.

We use mathematics test scores as our educational attainment outcome for the survey participants.⁷ Scores are scaled to have a mean across core participating countries of 500 and a standard deviation of 100. Estimates of the link between jobless households in childhood and offspring achievement are presented for the 24 countries also included in EU-SILC. Although PISA has several strengths, we also recognize that psychological research has shown stress to temporarily reduce the cognitive ability of test takers (Haushofer and Fehr 2014; Mani et al 2013) and hence that any association we find between jobless households and PISA scores may not represent a lasting effect.

Stage 2: EU-SILC analysis

We estimate a similar series of intergenerational models using EU-SILC. The key difference now is that the dependent variables are measured in adulthood. The first measures the association of joblessness between parents and their offspring. Specifically, we estimate the following probit model of how joblessness in the second generation ($w_{i,t}$) is associated with experiencing a jobless household in the first generation ($w_{i,t-1}$) across all countries (K.)

$$F(w_{itk}) = \Phi(\alpha_k + \beta_k w_{i,t-1,k} + C_{itk}) \nabla K, \quad (2)$$

Where:

w_{itk} = Whether the second-generation (offspring) is defined as working (0) or workless (1)

$w_{i,t-1,k}$ = Whether the second-generation lived in a working (0) or jobless household at 14 (1)

C_{itk} = A vector of controls, including immigration status, age, number of children in household and average age of the children in household⁸

⁷ PISA tests children in reading, mathematics and science. We have chosen mathematics scores as our outcome as this was the focus of the PISA study in 2012.

⁸ It is standard practice in the intergenerational literature to only control for things that may cause bias in the measurement of the main variables of interest, such as age (see Lee and Solon, 2009). Given our focus on joblessness rather than incomes, we additionally control for number of children and the average age of children

Φ = Cumulative standard normal distribution for the probit model.

i = Individual i

t = Refers to the *second* generation (and $t-1$ to the first generation)

∇K = Denotes that all models are estimated separately for each country.

We present marginal effects, or the difference in the probability of the second-generation being workless, depending upon whether they lived in a jobless household at age 14, holding all other values constant at their mean, for each country.

In our second set of models, we consider the association between jobless households in the first generation ($w_{i,t-1}$) and adult poverty in the second generation, where:

p_{itk} = Whether the equivalised household income of the second-generation (offspring) is defined as above the at-risk-of-poverty threshold (0) or at or below the at-risk-of-poverty-threshold (1).

$$F(p_{itk}) = \Phi(\alpha_k + \tau_k w_{i,t-1,k} + C_{itk}) \nabla K, \quad (3)$$

Our presented estimates are the marginal effect, or the difference in the probability of the second-generation being in poverty, depending upon whether they lived in a jobless household at age 14, holding all other values constant at their mean.

Our EU-SILC analysis draws upon the cross-sectional sample from 2011, which included an additional intergenerational module⁹. In this survey, respondents were asked to recall from their childhood questions about their parents. Measures of joblessness in the parents' generation (who were typically born around 1937-1957) are based on the main activity status of parents in the household when the survey respondent was 14 years old. Each parent present in the household is defined as jobless if their main activity status when the respondent was 14 was unemployed, fulfilling domestic tasks and care responsibilities or other inactive. Those in employment or self-employment are defined as employed. Studies of jobless households commonly combine ILO defined measures of unemployment with other forms of joblessness to capture a broader population of households without an earner.

in the household as this may bias our measures of joblessness. In addition, as our estimates are across a range of countries we also control for immigration status (see Jerrim and Macmillan, 2015).

⁹ Note that the parents of the PISA students are observed within a year of the second-generation EU-SILC survey respondents and are similar in age. These measures have also been used in Berloff et al., (2017).

The recall-based nature of the childhood experience is likely to increase measurement error in the EU-SILC data. However, it is also likely to be focused on sustained rather than transitory joblessness. Hence the data are likely to capture sustained childhood disadvantage. Given potential issues with recall bias for the measure of parental joblessness for the first generation, reported workless rates for fathers and mothers are compared to workless rates for each country from OECD Labour Force Statistics over similar time periods (see Appendix discussion and Figures A2-A5). This analysis leads to us focusing upon the subset of 16 countries with more historical data available. The key motivation for restricting attention to this subset of 16 countries is that we believe the reporting of parents' jobless status to be far more reliable. Nevertheless, for completeness, the results for the other eight nations for the PISA and EU-SILC samples are included in the results tables (Tables A2-A4 in the Appendix)¹⁰.

In a similar manner to PISA, we define the first generation as a jobless household if the respondent reported living with both parents and both were jobless at age 14 or if the respondent reported living with just the mother or just the father and that parent was jobless at age 14. This will therefore measure a persistent workless experience for the first generation. The first column of Table 2 summarises the average level of workless households across countries; consistent with previous literature in this area, the UK, Belgium and Ireland have the highest proportion of jobless households while Norway, Greece and Denmark have a lower proportion of jobless households at age 14. As noted by OECD (1998) there is much less variation across countries in household measures of joblessness compared to individual measures of joblessness (as seen in Table 2, although women rather than men predominantly drive the variation in individual-level measures). Comparing jobless household rates in the second generation of EU-SILC (columns 2 and 4 of Table 2) to jobless household rates of parents in PISA (column 1 of Table 1), there are clear similarities across the two surveys.

Table 2 here

There is variation in the proportion of lone parents across countries (see bottom panel of Appendix Figure A1) but we combine this information here for reasons of brevity. As noted in sections 1 and 2, family structure has been the focus of much previous research on this topic

¹⁰ Item non-response rates for fathers' and mothers' activity status questions from the intergenerational unit are also reported and discussed in the Appendix (see Table A1). Both questions have low rates of missing data across countries (average less than 2%).

and has been found to play a less important role in the formation of jobless households than employment polarization.

The second generation, typically born around 1965 to 1985, is defined as workless if they spend the entire 12-month reference period of the survey¹¹ out of work. The respondent is asked about their main activity in each month of the reference period, with priority given to economic activity if a similar time is spent in two activities in the same month. Joblessness is defined as either unemployment, disabled and / or unfit to work, fulfilling domestic tasks and care responsibilities or other inactivity reported as the main activity status for each month. Those reporting any employment or self-employment within the 12-month period as their main activity status are assigned as employed. We are therefore also measuring a persistent spell of joblessness in EU-SILC in the second generation and sustained disadvantage in both generations. We compare male and female respondents, sons and daughters for the purpose of this analysis, from the EU-SILC to men and women from the OECD LFS from 2011, finding strong correlations between the workless rates across surveys ($\rho=0.90$ for men and $\rho=0.97$ for women).

Adult poverty in the second generation is defined based on the survey respondents' equivalised disposable household income (after transfers) over the 12-month reference period of the survey. Disposable household income (after transfers)¹² is equivalised based on the number of adults and number of children present in the household with the OECD-modified scale used where adults are weighted by 0.5 and children by 0.3 (see Mack and Lange, 2015, for full details). The country-level median equivalised disposable income (weighted using adjusted personal weights) is used to create an at-risk-of-poverty threshold (ARPT), which is defined here, as standard, at 60 per cent of the median country-level value. Adult poverty is then defined as 1 for those with equivalised disposable household incomes at or below the ARPT in their country and 0 for those above this threshold. When comparing the share of the population defined as at-risk-of-poverty for each of the 16 countries from our main analysis to national statistics from 2011 from the Office of National Statistics and Eurostat, based on the same data we find a very high correlation between the population and national statistics ($\rho = 0.93$). Weights from this

¹¹ Typically a fixed 12 month period such as the previous calendar or tax year or the 12 months preceding the survey

¹² We have also considered a market-based measure of poverty based on income before transfers. See Appendix for full discussion and results.

intergenerational module are used throughout our estimation. Sample sizes for each country for both of our outcomes are presented in columns 3 and 5 of Table 2.

Stage 3: Combining the EU-SILC and PISA analysis

After estimating the marginal effect of experiencing a jobless household in adolescence across our three outcomes, education, adult joblessness, and adult poverty, we examine whether they provide robust evidence of differential penalties to workless households in childhood across countries. Specifically, we hypothesise that countries with a higher estimated intergenerational joblessness association and higher associations between jobless households in childhood and adult poverty will display a more pronounced negative relationship between jobless households and children's education. Given issues of recall and attenuation within our measures of joblessness, discussed above, we argue that even a moderate correlation between these two estimates would be indicative of robust differences in the implications for experiencing a jobless household in childhood across countries.

3. Results

Children in jobless households and educational attainment (PISA)

Figure 1 present results from estimating the relationship between household joblessness and children's maths scores for the 16 countries used in our final analysis (Appendix Table A2 presents the results for all countries including standard errors and sample sizes). In all countries, those children in jobless households do less well in the maths test. However, there is considerable variation in this test score penalty. Belgium and Ireland, and to a lesser degree the UK and Germany, have large and significant negative associations between experiencing a jobless household at 15 and maths performance. This penalty equates to 0.6 of a standard deviation in Belgium while, at the other end of the spectrum, the penalty is closer to 0.2-0.4 of a standard deviation in the Netherlands, Greece and Finland.¹³

More generally, differences in maths achievement between children from jobless versus working households tend to be greater in countries where a large proportion of young people are living with parents who are not in work. However, the strength of the association is weaker than for longer-term outcomes ($\rho = -0.35$ for males and -0.33 for females).

¹³ For girls, the differences between Belgium and the Netherlands and Belgium and Greece and Belgium and Finland are all statistically significant at the five per cent significance level. For boys, these differences are also statistically significant at the five per cent significance level.

Figure 1 here

Importantly, there is not much variation by gender in the association between children in jobless households and educational attainment across countries. This is both expected – there is little reason to assume that girls and boys would perform substantively differently in tests given household jobless experiences within the same education system – and telling us something important about the mechanisms of intergenerational joblessness being quite distinct across genders, a point we return to shortly.

Intergenerational joblessness: Children in jobless households and adult joblessness (EU-SILC)

Figure 2 presents the association between experiencing a jobless household at 14 and adult joblessness across European countries, ranking countries in terms of the strength of the intergenerational association in joblessness¹⁴ (Appendix Table A3 includes estimates from all 24 countries along with standard errors).

Figure 2 here

For men, Ireland, Belgium, Germany and the UK have the strongest and significant positive association between experiencing a jobless household at 14 and adult joblessness while in other countries such as the Netherlands, Denmark, Greece and Portugal there is no relationship at all.¹⁵ In Belgium and Ireland, males who experience a jobless household at age 14 are 19-20 percentage points more likely to be workless for the whole year leading up to the survey in adulthood than males from households with an employed parent. In Denmark and Portugal, males from jobless households have the same chance of being workless in adulthood as males with an employed parent at 14.

There are two main points to note from these results. First, countries with a higher proportion of children living in jobless households have the strongest intergenerational associations (Belgium, Ireland, the UK and Germany). The relationship between intergenerational associations across countries and a measure of the proportion of children living in jobless households (in 2011) is reasonably strong ($\rho = 0.53$ for males and $\rho = 0.54$ for females). An interesting outlier here is the Netherlands that has relatively high jobless household rates in the

¹⁴ Note that Norway is excluded from the second panel from Figure 2 as the association is driven by a very small number of jobless households ($n=2$) in this country in the first generation. Results are reported in Table A3.

¹⁵ The difference between UK and Netherlands (the smallest difference between the two groups of countries discussed in the text) is statistically significant at 95% confidence level: UK – Netherlands = 0.157 (0.058), z score = 2.69

EU-SILC (7 per cent, see Table 2) and yet no association in intergenerational joblessness. Given issues with recall in our main explanatory variable and likely attenuation bias, these estimates should be viewed as lower bounds¹⁶.

Second, in contrast to our education results, our findings differ notably by gender. While there is little evidence of intergenerational joblessness for men in Greece, there is a strong positive association for women.¹⁷ For countries such as Spain and Sweden, there is a moderate association for both men and women, whereas Belgium, Italy and most notably Ireland have strong associations for both men and women. Netherlands, Portugal and Denmark have no estimated intergenerational joblessness associations for either gender.

Children in jobless households and adult poverty (EU-SILC)

Figure 3 present the associations across countries between experiencing a jobless household at age 14 and being at-risk-of-poverty in adulthood (Appendix Table A4 present the results for the other eight countries).¹⁸

Figure 3 here

Similar to the patterns found for intergenerational joblessness, there are large differences in the associations between childhood household joblessness and adult poverty across countries. Once again, in Ireland, Belgium and the UK, those who experience a jobless household at 14 have a much higher probability (0.16 – 0.21) of being at-risk-of-poverty as an adult compared to those with an employed parent at 14. Conversely, in other countries, such as Portugal, Greece and Denmark, there is no difference in the risk of adult poverty for those from jobless compared to working households in childhood.

There is slightly less variation across genders in terms of poverty outcomes in adulthood compared to joblessness. While there are some minor differences in rankings, France and Italy along with Ireland, Belgium and the UK have high associations for both men and women in terms of adult poverty. Denmark, Finland, Netherlands and Portugal all have typically low

¹⁶ We have investigated the extent to which our results are driven by macro-level factors that vary across countries such as the Great Recession, and female participation rates, using multi-level models. The inclusion of measures of country-level workless, unemployment and participation rates do very little to change the country-level intergenerational associations. This is similar to the findings from Macmillan (2014) where the inclusion of county-level unemployment alone does little to the intergenerational estimates.

¹⁷ The difference between estimates for men and women in Greece are significant at 95% confidence levels ($z=2.20$), assuming dependent samples.

¹⁸ Again, Norway is excluded from the second panel from Figure 3 as the association is driven by a very small number of jobless households ($n=2$) in this country in the first generation.

associations between childhood household joblessness and adult poverty for males and females. Where differences do exist across genders within countries, the patterns are typically quite consistent with the findings for intergenerational joblessness: Germany has slightly higher associations for males compared to females whereas Greece has higher associations for women compared to men.

As with the intergenerational joblessness analysis, there are strong correlations between country-level measures of the proportion of children experiencing a jobless household in childhood and intergenerational associations between childhood household workless experience and adult poverty for males ($\rho=0.64$ for males and $\rho=0.33$ for females). Countries with a high proportion of children experiencing a jobless household in childhood also have more severe longer-term penalties for those children.

Comparing across the two long-term outcomes in the EU-SILC, perhaps unsurprisingly given that both outcomes are indicators of deprivation and social exclusion, there is a strong correlation across countries between intergenerational joblessness and the association between childhood jobless households and adult poverty ($\rho=0.86$ for males and $\rho=0.41$ for females). Hence, the intergenerational transmission of disadvantage, as captured in the second generation by either a lack of employment or poverty, appears to be similar for broadly the same set of countries.

Ireland, Belgium, the UK, Italy and France stand out as having strong intergenerational transmission of disadvantage. In contrast, for many countries childhood disadvantage is not associated with adult deprivation (the Netherlands, Denmark, Finland and Portugal).

Comparing medium- and long-term associations across countries

To assess whether countries with higher intergenerational jobless associations also experience larger educational penalties associated with experiencing a jobless household in childhood, we combine results from the two previous sub-sections. Our findings are presented in Figures 4 and 5 (see Appendix Figure A6 and A7 for the extended sample).

Figure 4 here

The top panel of Figure 4 shows that, for males, countries with more intergenerational joblessness in our EU-SILC analysis also have larger penalties in terms of the link between children in jobless households and educational attainment in our PISA analysis. The correlation is -0.47 across the 16 countries. The top panel of Figure 5 shows that there is also a moderate

relationship across countries when considering the association between children in jobless households and adult poverty outcomes in EU-SILC and the association between children in jobless households and educational outcomes in PISA ($\rho=-0.39$).

Figure 5 here

While at face value these present a moderate correlation, it is important that this is interpreted in context. Figures 4 and 5 bring together intergenerational estimates across two completely different data sources. As illustrated in our results tables, intergenerational estimates for all countries are subject to quite a large degree of sampling error. In other words, any measurement error in our results at the country level will attenuate the relationships depicted in Figure 4 and 5. We therefore interpret these moderate correlations as providing reasonable evidence that there may indeed be longer-term, multi-generational scars to jobless experiences for males.

In contrast, the second panel of Figure 4 shows that there is no evidence of a relationship across countries between intergenerational joblessness in EU-SILC and children in jobless households and educational outcomes in PISA for girls. This difference by gender may not be altogether surprising if there are different mechanisms driving intergenerational joblessness.

For males, there is a fairly homogenous process across countries of leaving education and entering the labour market, while for women there are large differences across countries in terms of cultural expectations after completing education. Models of employment have traditionally focused on the ‘male breadwinner’, limiting the centrality of work for women (Simpson and Simpson, 1969; Kaufman and Fetters, 1980). While the rise of women in education and the labour market has changed this model to focus on a ‘modern’ pattern, where women and men have more similar career trajectories, there is still evidence that men and women respond differently to workless spells (Kulik, 2000). Women have been found to confront joblessness differently and are less likely to seek a new job or retraining than men (Leana and Feldman, 1988). Unemployed women are also more likely to reject new job offers on the basis of family responsibility, across the education distribution (Kulik, 2000). As a result, the link between educational attainment and later joblessness is far less clear for women than it is for men.

There is a stronger relationship between the educational penalties and adult poverty for women ($\rho= -0.25$), although Denmark is a major outlier. In Denmark, the educational penalty from coming from a disadvantaged family is in the middle of the range across countries but the adult poverty outcome associated with coming from a deprived family is very low. Among the other

countries, an increase in the test score penalty from coming from a deprived family of 20 points is associated with a stronger association between childhood deprivation and adult poverty of around 5 points. Given that the OECD equates 30 PISA test points with a year's worth of schooling, these penalties are large.¹⁹

The two sets of results suggest that the intergenerational transmission of disadvantage works through educational penalties associated with deprivation. Whilst Denmark stands out as country where educational disadvantage associated with childhood deprivation does not translate into poverty in adulthood, Ireland and the UK produce a stronger intergenerational transmission of disadvantage for women than the test score penalties would predict. Belgium and Germany stand out as both having strong intergenerational transmission of disadvantage and large educational penalties. Finland and the Netherlands stand out at the other end as having small educational penalties from coming from a deprived childhood and low intergenerational transmission of disadvantage.

4. Conclusion

The most convincing results of international comparisons use harmonised data across countries. This study presents one of the first pieces of research to consider the intergenerational transmission of disadvantage with internationally comparable data. We use a commonly used indicator of social exclusion, the experience of a jobless household at the age of 14/15, to capture experiences of childhood deprivation. We consider for the first time the association between this and adult disadvantage in the labour market (intergenerational joblessness), adult poverty and education across countries. While intergenerational transfers across other domains such as income, social class and education have been widely researched, more often this is with a limited set of countries using country-specific data. Here we advance this literature by considering the transmission of disadvantage across a large range of countries with comparable data.

We use two data sources to estimate the association between childhood household joblessness and adult joblessness (intergenerational joblessness), adult poverty, and education across a number of European countries. The cross-country patterns can then offer a suggestion about the role of education as the driver of the intergenerational transmission of disadvantage. We find some significant similarities across countries: those with high levels of intergenerational

¹⁹ See OECD (2016: Box I.2.1).

joblessness and stronger associations between childhood household joblessness and adult poverty typically have larger penalties to household joblessness in terms of education.

For males, Belgium, Ireland, the UK exhibit strong associations between childhood deprivation and all three outcomes. These are all countries with a history of high levels of children growing up in jobless households. This research provides the first evidence that high levels of this indicator of social exclusion suggest large medium- and long-term penalties across generations. Other countries such as Netherlands, Denmark, Finland and Greece show little association between childhood deprivation, adult joblessness and poverty and only modest penalties in terms of educational attainment.

For females, the picture is less clear. There are some suggestive patterns of stronger associations in terms of adult joblessness, poverty and education and childhood household joblessness in France, the UK and Belgium while women in Finland, Spain and Netherlands appear to face small or insignificant penalties to experiencing a jobless household in childhood in terms of labour market, poverty and education outcomes. Here, though, the education penalties to experiencing a jobless household do not map onto penalties in terms of labour market outcomes as well as they do for males, perhaps reflecting the heterogeneous range of options available to women upon leaving full time education.

Taken together, this research presents new evidence that there are long scars to experiencing a jobless household, and to the extent that this reflects childhood disadvantage, the intergenerational transmission of disadvantage in a particular set of countries. But this adverse set of outcomes is not universal. A smaller set of countries shows little or no issue with persistence in disadvantage across generations or evidence in just one domain (education in Denmark's case). Typically, countries with higher proportions of children in jobless households have worse medium- and longer-term outcomes for those children. This suggests that this is a powerful measure of social exclusion. Countries with a high proportion of children in jobless households are also worse at protecting those children from becoming the next generation of jobless households.

This also conforms with previous estimates of intergenerational income mobility for the small subset of countries (Scandinavia, Germany, France, Italy and the UK) where these are available (see Corak, 2013). Here, we extend the number of countries considered, using comparable cross-national data on childhood deprivation and adult outcomes. Our findings

suggest Belgium and Ireland are low mobility countries, such as the UK and France, while the Netherlands may be a country of high mobility, similar to Denmark and Finland.

The data has limitations about what it can tell us about policy implications for these patterns of outcomes associated with childhood experiences as we are restricted to discussing associations rather than understanding causal estimates. Yet given these limitations, we argue that the fact that we find moderate to strong associations between countries across the two data sources and across three outcome domains is an important finding, which advances our understanding of how this key indicator of social exclusion varies across countries.

Future research can build on this work to begin to explore potential mechanisms to understand why countries have such different experiences of disadvantage across generations. On the demand side, one potential mechanism is the strength of the labour market in each country. Macmillan (2014) finds that while area unemployment alone does little to account for jobless associations across generations, the interaction between jobless experiences in childhood and weaker labour markets does have a significant effect on the jobless experiences of the second generation. On the supply side, the role of welfare generosity, and the provision of good quality alternatives to standard education routes, including help for people to return to education, are two potential mechanisms that might protect the second generation against this persistent form of disadvantage.

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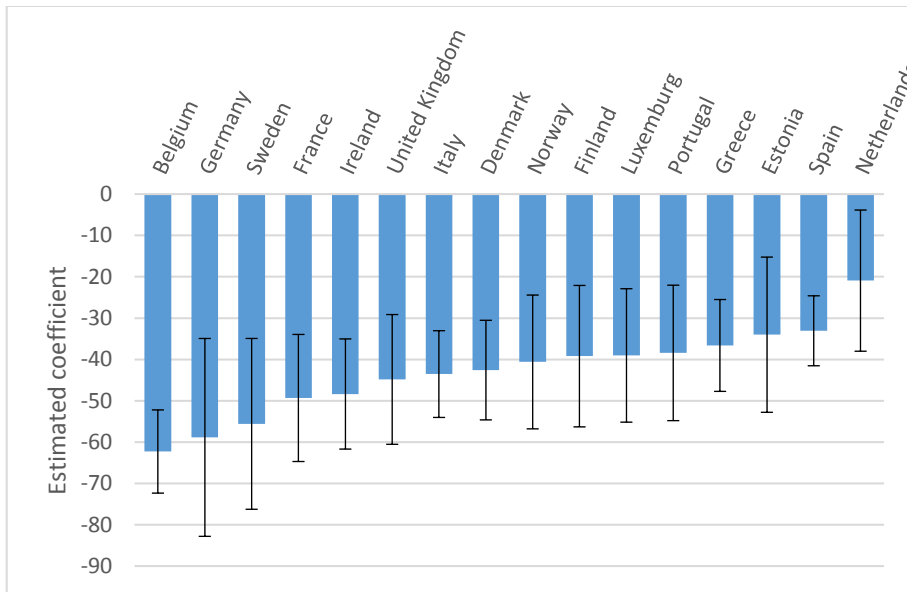
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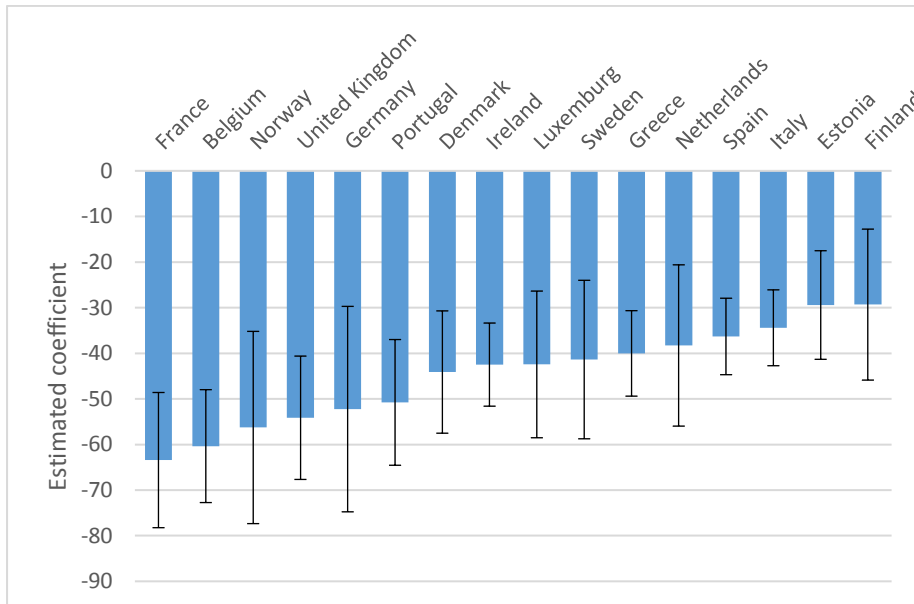
Figure 1: Estimated relationship between experiencing a jobless household in childhood and maths scores in PISA 2012 for sons and daughters

Sons

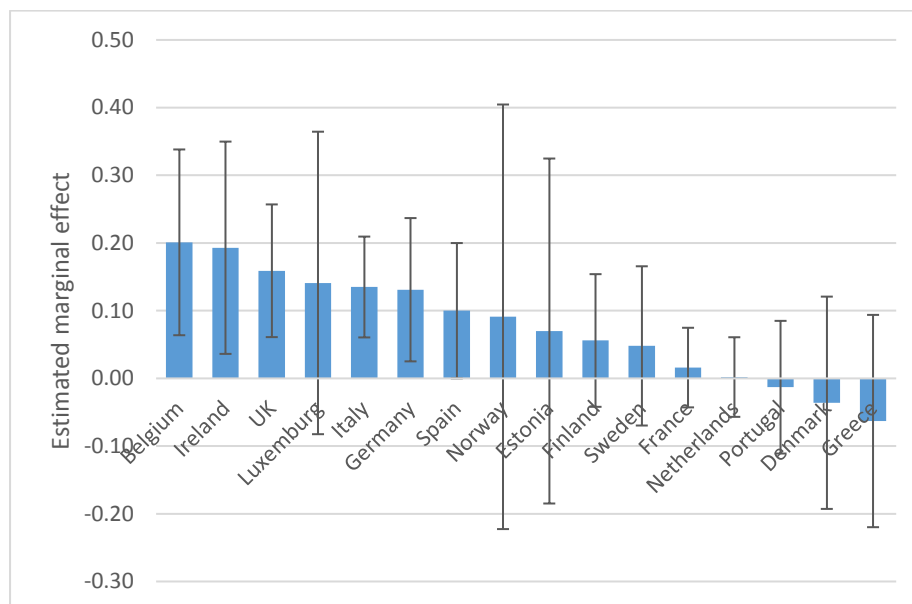


Estimated associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

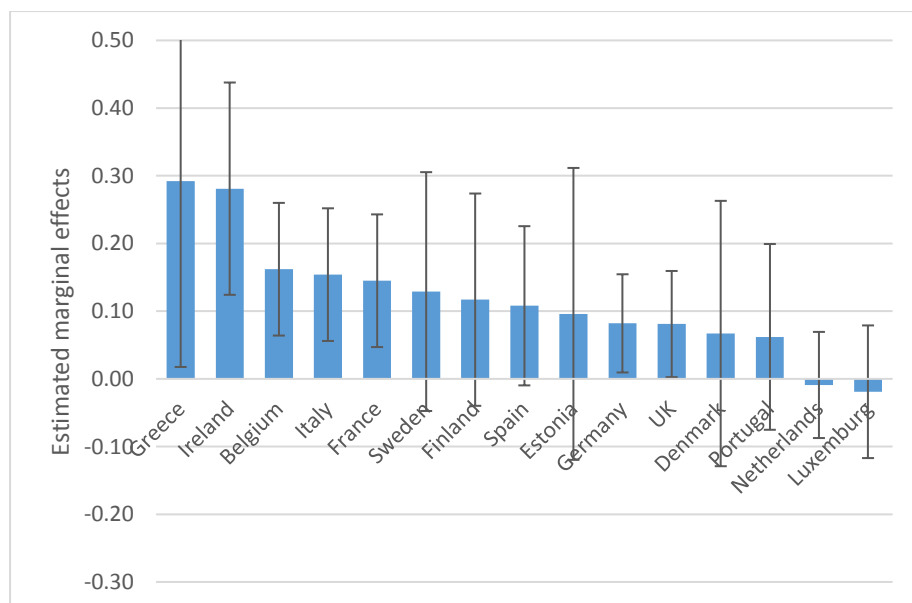
Daughters



Estimated associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

Figure 2: Estimated intergenerational joblessness in the EU-SILC 2011 for sons and daughters**Sons**

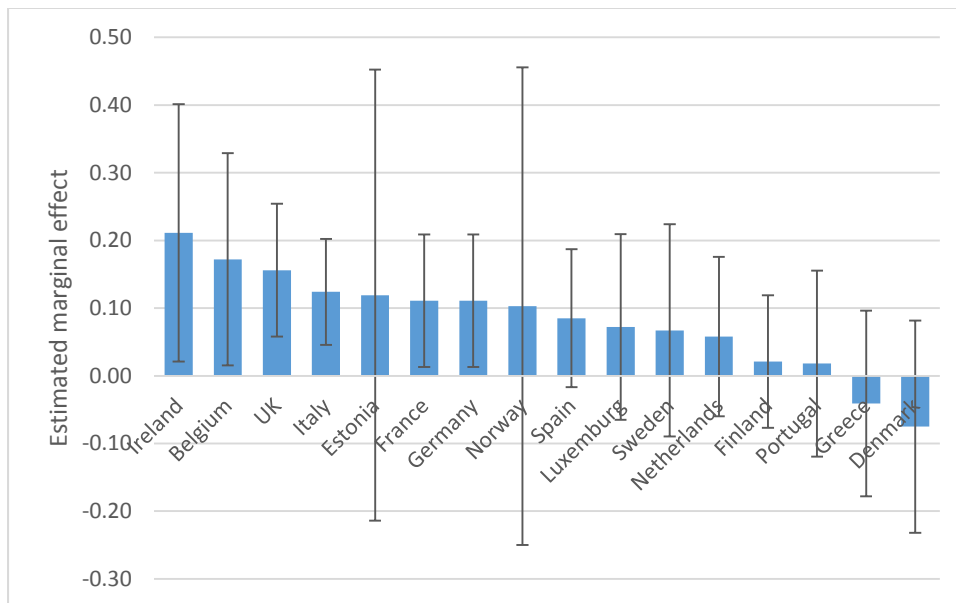
Estimated associations from country-specific regressions: probit of sons spending a whole year jobless on an indicator of jobless household at 14, quadratic age controls for head of household and sons and a dummy for immigration status, number of children in the household and average age of children in household. Sample restricted to those reporting the main activity of the parent(s) they lived with at 14 between 1981 and 2000 with a full 12 month activity history. Intergenerational unit weights applied.

Daughters

Estimated associations from country-specific regressions: probit of daughters spending a whole year jobless on an indicator of jobless household at 14, quadratic age controls for head of household and daughters and a dummy for immigration status, number of children in the household and average age of children in household.. Sample restricted to those reporting the main activity of the parent(s) they lived with at 14 between 1981 and 2000 with a full 12 month activity history. Intergenerational unit weights applied. Norway excluded given extreme values based on small number of obs.

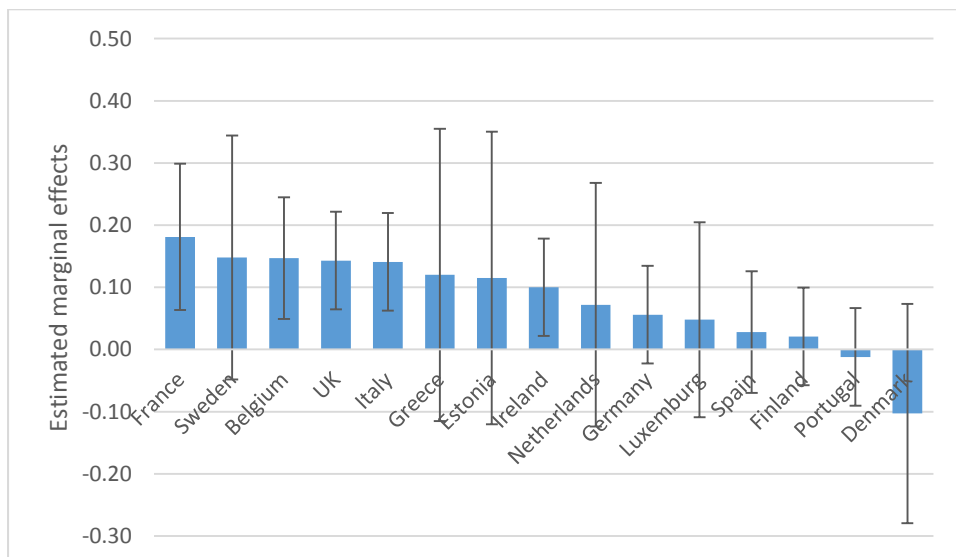
Figure 3: Estimated association between experiencing a jobless household in childhood and adult poverty in the EU-SILC 2011 for sons and daughters

Sons



Estimated associations from country-specific regressions: probit of an indicator of poverty for sons (measured as at or below the at-risk-of-poverty threshold, 60% of median equivalised disposable income after transfers) on an indicator of jobless household at 14, quadratic age controls for head of household and sons and a dummy for immigration status, number of children in the household and average age of children in household.. Sample restricted to those reporting the main activity of the parent(s) they lived with at 14 between 1981 and 2000 with information on equivalised disposable household income. Intergenerational unit weights applied.

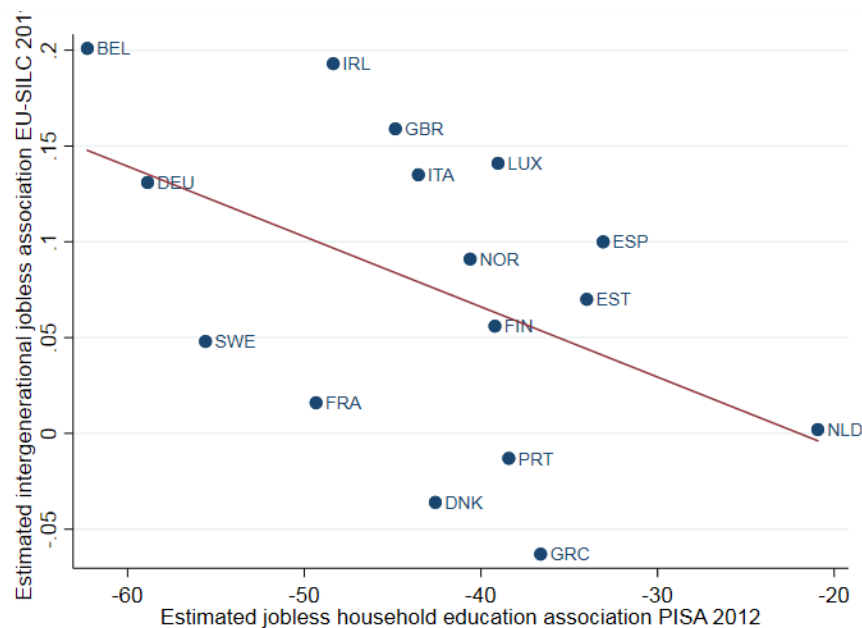
Daughters



Estimated associations from country-specific regressions: probit of an indicator of poverty for daughters (measured as at or below the at-risk-of-poverty threshold, 60% of median equivalised disposable income after transfers) on an indicator of jobless household at 14, quadratic age controls for head of household and daughters and a dummy for immigration status, number of children in the household and average age of children in household.. Sample restricted to those reporting the main activity of the parent(s) they lived with at 14 between 1981 and 2000 with a information on equivalised disposable household income. Intergenerational unit weights applied. Norway excluded given extreme values based on small number of observations.

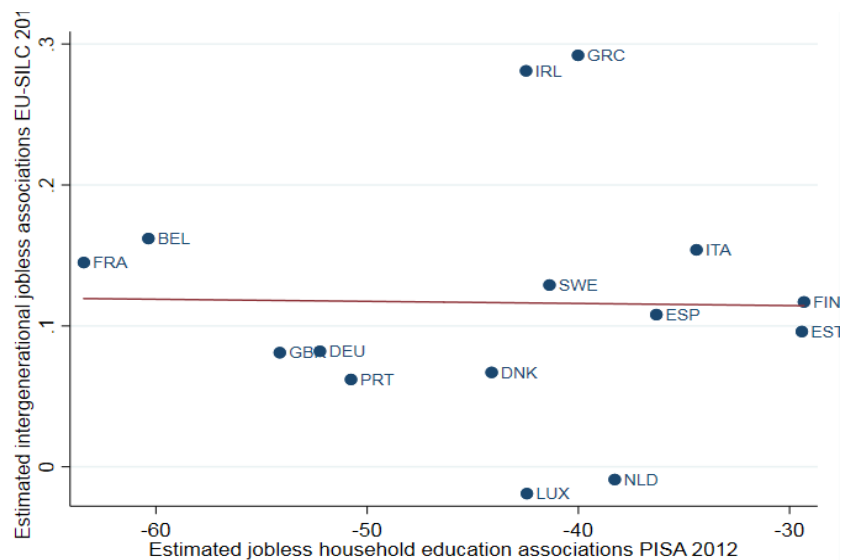
Figure 4: Relationship between intergenerational joblessness in the EU-SILC 2011 and experiencing a jobless household in childhood and maths associations in PISA 2012

Sons



Pearson correlation: -0.472, p value:0.065, Spearman rank: -0.447, p value:0.083. P values on cross-country correlations are reported throughout but should be interpreted with caution as we do not have a random sample of countries by design.

Daughters

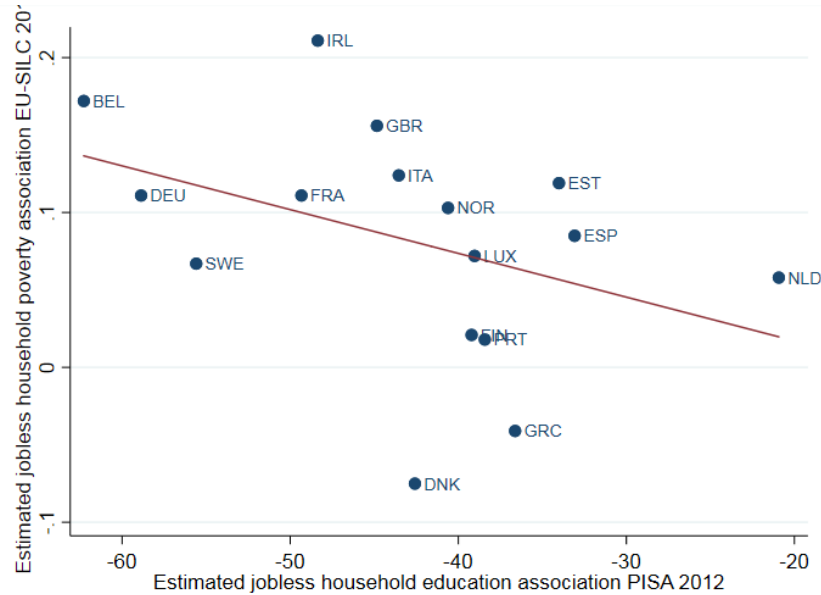


Pearson correlation: -0.018, p value:0.950, Spearman rank: 0.029, p value:0.920. Norway excluded for daughters given extreme values based on small number of observations. See Table A3.

EU-SILC estimated associations from country-specific regressions: probit of sons and daughters (estimated separately) spending a whole year jobless on an indicator experiencing a jobless household at 14, quadratic age controls for head of household and sons/daughters and a dummy for immigration status, number of children in the household and average age of children in household.. Sample restricted to those reporting their head of household's main activity between 1981 and 2000 with a full 12 month activity history. Intergenerational unit weights applied. PISA estimate associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

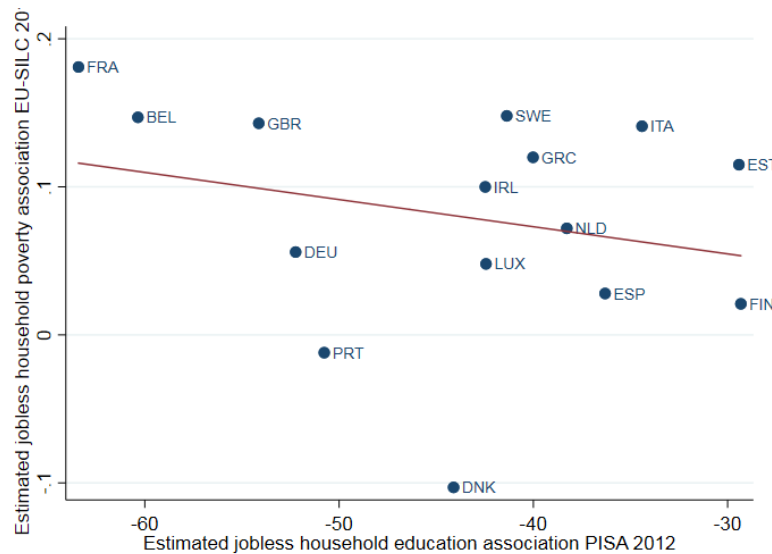
Figure 5: Relationship between experiencing a jobless household in childhood and adult poverty in the EU-SILC 2011 and experiencing a jobless household in childhood and maths associations in PISA 2012

Sons



Pearson correlation: -0.392, p value:0.133 Spearman rank: -0.497, p value: 0.050.

Daughters



Pearson correlation: -0.251, p value:0.366, Spearman rank: -0.293, p value:0.290. Norway excluded for daughters given extreme values based on small number of obs. See Table A4.

EU-SILC estimated associations from country-specific regressions: probit of sons' and daughters' poverty indicator (measured as at or below the at-risk-of-poverty threshold, 60% of median equivalised disposable income after transfers) on an indicator of jobless household at 14, quadratic age controls for head of household and daughters and a dummy for immigration status, number of children in the household and average age of children in household.. Sample restricted to those reporting the main activity of the parent(s) they lived with at 14 between 1981 and 2000 with information on equivalised disposable household income. Intergenerational unit weights applied. PISA estimate associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

Table 1: Average proportion jobless households and average maths scores in PISA 2012 for our sample

Country	Percent Jobless Hhd	Sons' maths scores	N	Daughters' maths scores	N
Austria	5.1	517	2398	494	2357
Belgium	10.6	520	4310	509	4287
Czech Republic	6.2	505	2647	493	2680
Denmark	8.1	507	3704	493	3777
Estonia	6.6	523	2370	518	2409
Finland	6.4	517	4459	520	4370
France	8.2	499	2238	491	2375
Germany	5.7	520	2539	507	2462
Greece	14.9	457	2549	449	2576
Hungary	11.8	482	2281	473	2529
Iceland	4.7	490	1769	496	1739
Ireland	14.1	509	2471	494	2545
Italy	7.7	494	15830	476	15243
Luxemburg	6.4	502	2677	477	2581
Netherlands	6.0	528	2315	518	2145
Norway	4.4	490	2395	488	2291
Poland	11.4	520	2219	516	2388
Portugal	9.9	493	2869	481	2853
Slovak Republic	11.3	486	2447	477	2231
Slovenia	6.6	503	3212	499	2699
Spain	10.4	492	12623	476	12690
Sweden	4.9	477	2358	480	2378
Switzerland	4.5	537	5650	524	5579
UK	10.0	500	6351	488	6308

Table 2: Average proportion jobless households at 14, and adult sons and daughters jobless and poverty rates across countries in the EU-SILC 2011 for our sample

Country	Percent Jobless Hhd	Son jobless	N	Daughter jobless	N	Son Poverty	N	Daughter Poverty	N
Austria	2.6	5.7	1429	20.7	1637	14.0	1504	13.6	1712
Belgium	6.4	11.6	1501	17.4	1595	12.3	1535	13.8	1638
Czech Republic	1.2	6.0	1494	25.0	2040	7.9	1530	11.6	2075
Denmark	2.1	7.0	563	11.5	619	14.9	601	15.8	693
Estonia	0.9	12.3	1286	20.1	1290	13.7	1311	14.9	1331
Finland	3.8	7.4	1120	15.4	1064	11.0	1221	7.9	1173
France	3.6	6.7	2563	15.3	2724	10.2	2614	12.6	2798
Germany	4.1	6.6	2353	18.7	2817	12.8	2547	14.3	2986
Greece	1.2	17.1	1549	33.5	1561	15.9	1594	19.1	1601
Hungary	1.0	8.5	2774	27.6	3174	14.0	2857	13.9	3229
Iceland	1.5	4.6	415	8.5	399	9.3	458	13.3	478
Ireland	5.8	22.2	652	33.4	970	8.4	679	11.8	1011
Italy	4.4	11.6	4969	33.7	5300	16.0	5144	21.1	5568
Luxemburg	2.4	5.1	1688	15.4	1895	10.1	1742	13.9	1943
Netherlands	7.0	5.9	1326	11.2	1490	7.9	1371	12.2	1552
Norway	0.6	5.3	693	7.5	596	9.9	725	7.8	652
Poland	1.6	8.1	3357	19.7	3794	15.4	3402	14.8	3850
Portugal	2.8	11.8	1385	17.5	1483	13.3	1428	14.7	1529
Slovak Republic	0.5	10.9	1784	22.4	1837	11.1	1845	12.3	1897
Slovenia	2.6	5.9	1274	10.9	1253	9.7	1356	13.1	1364
Spain	3.6	16.5	3616	27.3	3785	17.3	3769	19.6	3934
Sweden	2.3	2.0	747	6.2	813	9.3	789	12.4	898
Switzerland	3.7	2.9	1411	16.4	1728	8.3	1471	9.8	1796
UK	6.9	8.4	1357	20.9	1726	10.4	1383	12.1	1772

Appendix

Measuring jobless households in childhood

EU-SILC 2011

Information on the birth date of the respondent was used to calculate the year in which the survey respondent turned 14. The reported jobless rates for each country in these given years was then compared to the jobless rate calculated as $(1 - \text{employment to population ratio})$ from national statistics for individuals age 40-44 (average age of fathers when the respondent was 14 is 43 and the average age of mothers is 41). Given the small sample sizes in the EU-SILC, averages are calculated over a ten-year period from 1971-1980, 1981-1990 and 1991-2000. Historical labour force data is only available for a small sub-sample of countries ($n=5$) in the 1970s, a larger sub-sample in the 1980s ($n=16$) and the full set in the 1990s ($n=24$).

While comparisons of jobless rates in the 1970s were poor (correlation 0.189 for fathers), Figure A2 shows that comparisons of jobless rates across sources were greatly improved for those reporting about their parents' main activity status in the 1980s. The upper graph illustrates a strong positive relationship between father's joblessness in the EU-SILC and male jobless rates in the OECD LFS with a correlation of 0.717 (p value:0.001) for the 16 countries available. For mothers and women in the second panel this is even stronger, with a correlation of 0.971 (p value:0.000).

For the 1990s, there was a correlation of 0.632 (p value:0.002) for EU-SILC fathers and OECD men for the original 16 countries where data was also available in the 1980s. In addition to these 16 countries, information on jobless rates are also available for 8 additional countries (typically 'newer' Eastern European nations) during the 1990s. When these are included, the correlation is weaker at 0.438 (p value:0.028) (see Appendix Figure A3). This is concerning given that it would be expected that the reporting of parents' activity status in more recent years might be more strongly correlated with national statistics. This could be reflecting the nature of the economies in former Soviet Union countries, which experienced near-full employment under communist rule. The concept of a jobless household in the first generation in these countries is therefore not as clear. Given this concern, the main results presented in section 4 will focus upon the subset of 16 countries with more historical data available.

Appendix Table A1 presents information on item non-response from the two main activity variables used to measure jobless households from the EU-SILC. As can be seen, the rate of item non-response is very low, averaging less than 2% across all countries.

PISA 2012

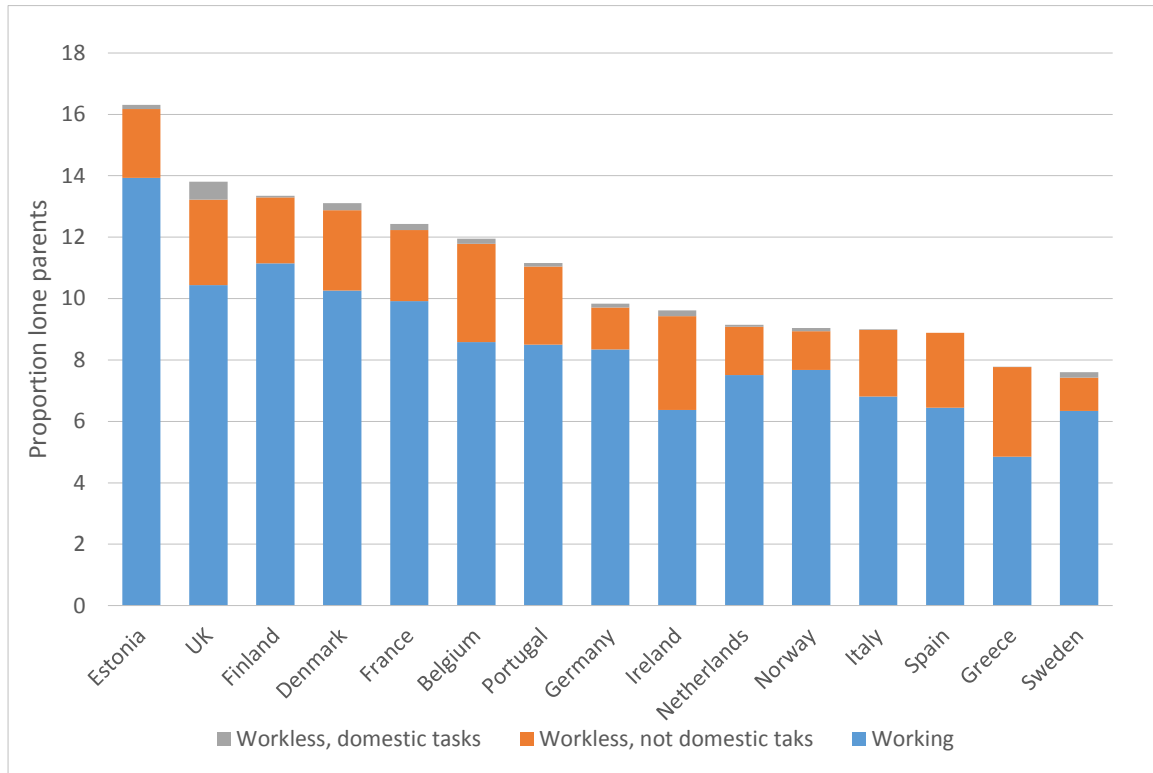
We investigate the reliability of respondent-reported father and mother jobless rates in PISA in a similar manner to EU-SILC, comparing these to OECD LFS statistics from 2012. Figure A4 illustrates that there is a strong correlation for fathers in PISA and males in the OECD LFS ($\rho=0.803$, p value:0.000) and a near-perfect correlation for mothers in PISA and females in the OECD LFS ($\rho=0.977$, p value:0.000). Appendix Figure A5 indicates that this also holds for the extended sample of 24 European countries, including the newer Eastern European countries.

Measuring poverty in adulthood

We choose to focus on poverty in adulthood defined as those with equivalised disposable household incomes at or below 60 per cent of the median country-level value. This measures the level of resource available in the household after transfers, capturing household deprivation, which will potentially have further impacts on future generations. An alternative way to measure poverty is to define it as those with equivalised gross household incomes at or below 60 per cent of the median country-level value. This measure of household incomes before transfers is closer to our other outcome measures in that it gives a market-based measure of household earnings power before redistribution. It therefore reflects the education, employment and partnering decisions of the household. We have replicated our analysis on poverty for this alternative measure (Table A5 and Figure A8). As expected, this measure strengthens the association between jobless households in childhood and adult poverty in some countries, such as Ireland, Belgium and the UK, and weakening the association in the Netherlands and France. For sons, the correlation between poverty associations in EU-SILC and education associations in PISA is very similar to that found using poverty based on income after transfers. For daughters, the strength of the relationship increases based on this market based measure of poverty, indicating that for women at least, welfare generosity is weakening the signal between human capital and deprivation.

Figure A1: Lone parent (mother) rates across countries by main activity

PISA 2012



EU-SILC 2011

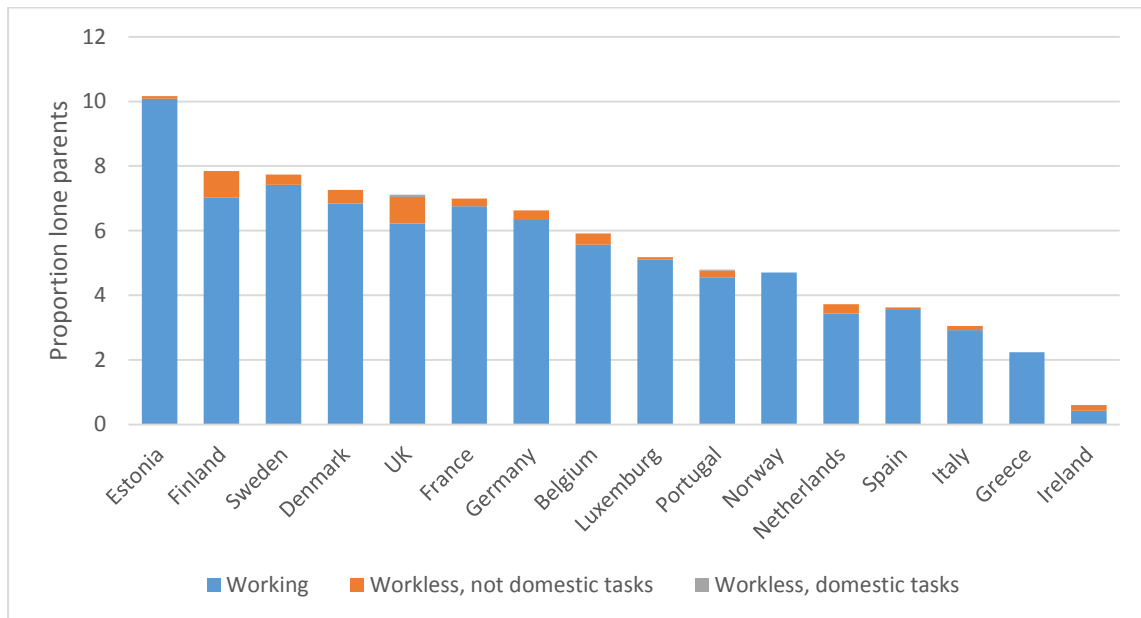
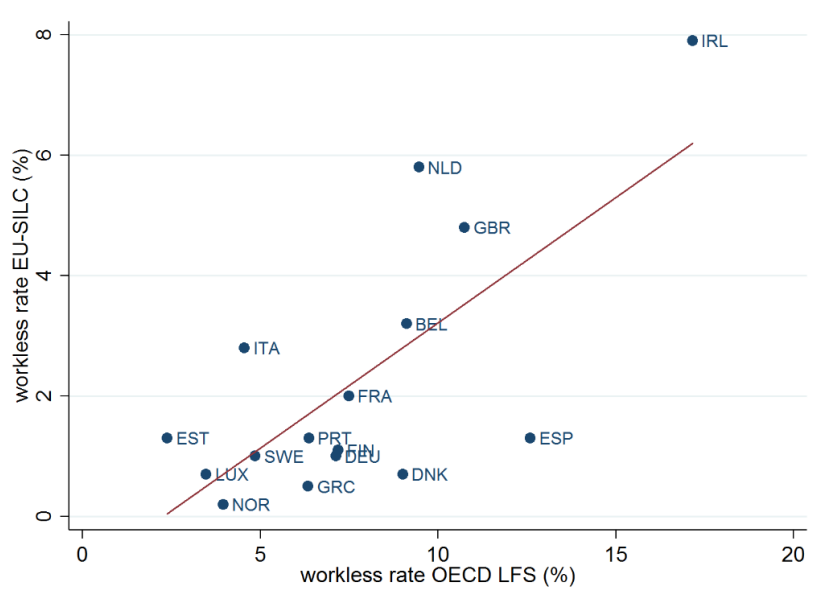


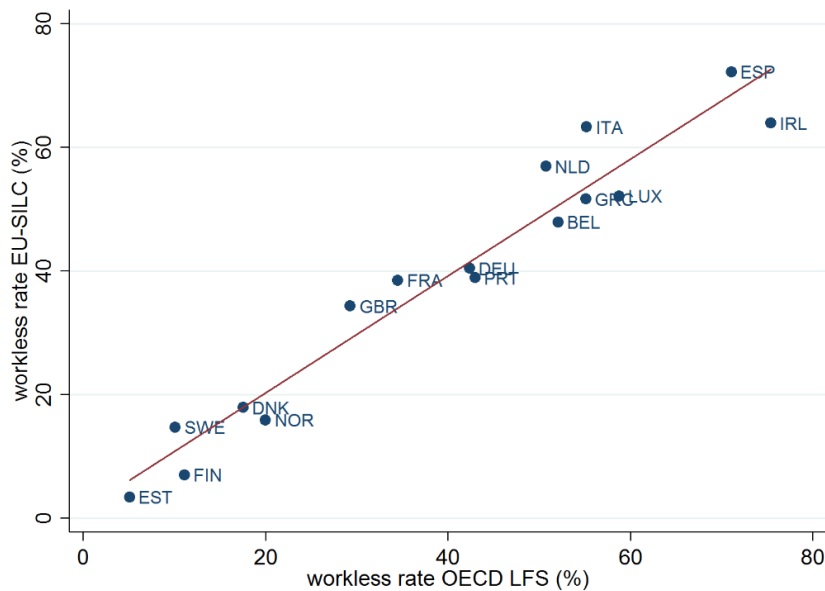
Figure A2: Jobless rates among fathers and mothers in the EU-SILC 2011 compared to OECD LFS 1981-1990

Fathers



Pearson correlation: 0.717 (p value:0.002), Spearman rank: 0.612 (p value:0.012). Jobless rate measured as (1 – employment / population ratio) in OECD LFS for men aged 40-44. Average taken from 1981-1990. Jobless rate measured as fathers reported unemployed, sick/disabled or other inactive as main activity when respondent age 14 between 1981-1990 in EU-SILC.

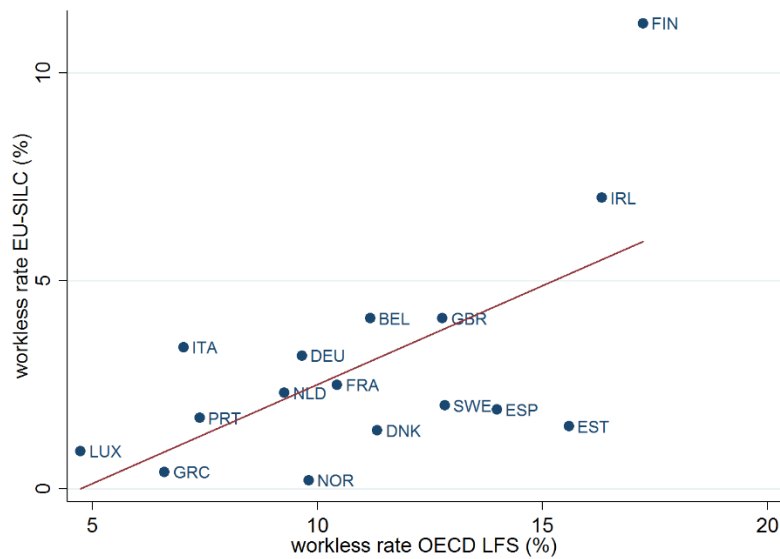
Mothers



Pearson correlation: 0.971 (p value:0.000), Spearman rank: 0.965 (p value:0.000). Jobless rate measured as (1 – employment / population ratio) in OECD LFS for women aged 40-44. Average taken from 1981-1990. Jobless rate measured as mothers reported unemployed, sick/disabled or other inactive as main activity when respondent age 14 between 1981-1990 in EU-SILC.

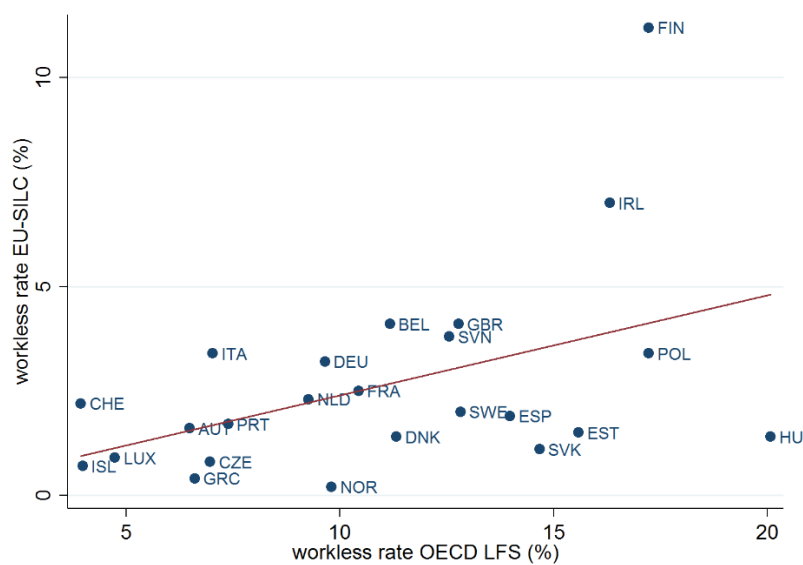
Figure A3: Jobless rates among fathers in the EU-SILC 2011 compared to OECD LFS 1991- 2000 for the restricted and extended sample

Restricted



Pearson correlation: 0.632 (p value:0.002), Spearman rank: 0.584 (p value 0.006)

Extended

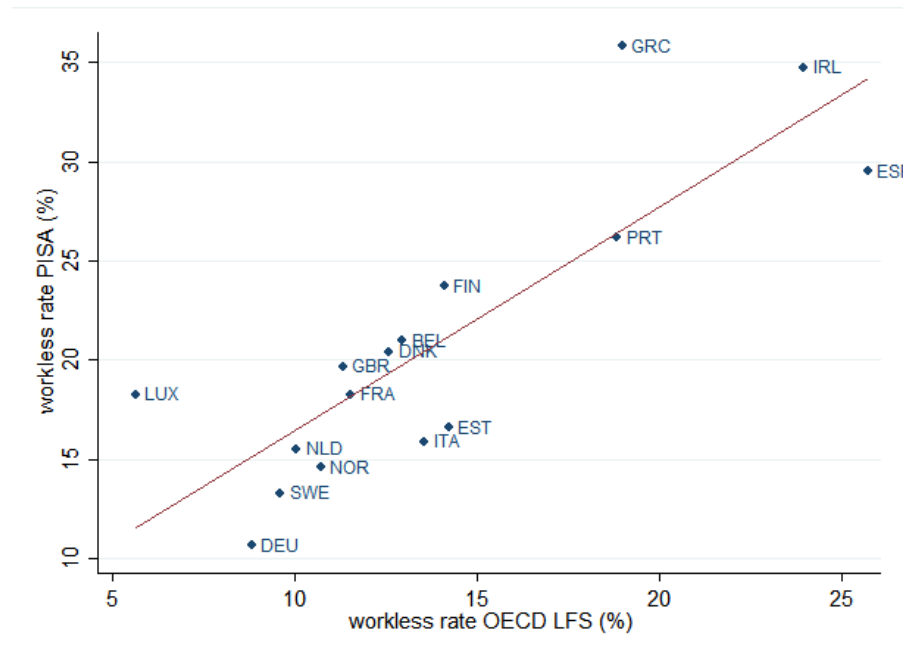


Pearson correlation: 0.438 (p value: 0.028), Spearman rank: 0.453 (p value:0.029).

Jobless rate measured as $(1 - \text{employment} / \text{population ratio})$ in OECD LFS for men aged 40-44. Average taken from 1991-2000. Jobless rate measured as fathers reported unemployed, sick/disabled or other inactive as main activity when respondent age 14 between 1991-2000 in EU-SILC.

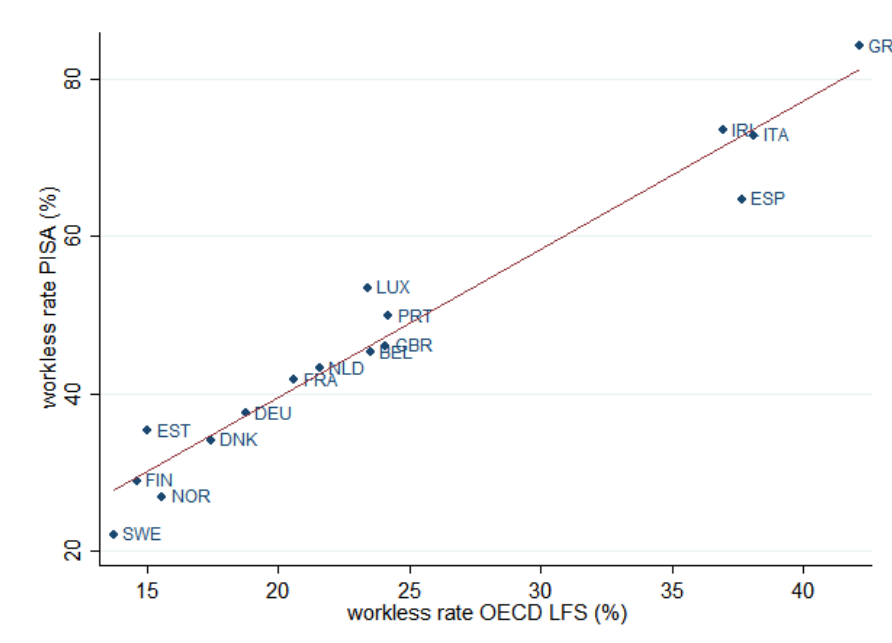
Figure A4: Jobless rates among fathers and mothers in PISA 2012 compared to OECD LFS 2012

Fathers



Pearson correlation: 0.833 (p value: 0.000), Spearman rank: 0.809 (p value: 0.000). Jobless rate measured as $(1 - \text{employment} / \text{population ratio})$ in OECD LFS for men aged 40-44 in 2012. Jobless rate measured as fathers reported 'not working, but looking for a job' or 'not working' as main activity when respondent age 15 in 2012 in PISA.

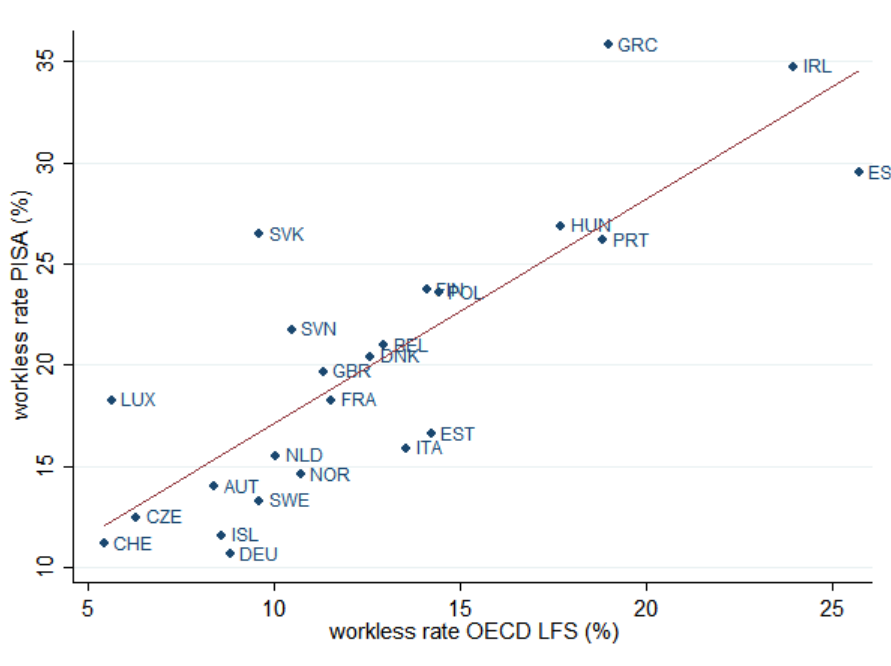
Mothers



Pearson correlation: 0.977 (p value: 0.000), Spearman rank: 0.959 (p value: 0.000). Jobless rate measured as $(1 - \text{employment} / \text{population ratio})$ in OECD LFS for women aged 40-44 in 2012. Jobless rate measured as mothers reported 'not working, but looking for a job' or 'not working' as main activity when respondent age 15 in 2012 in PISA.

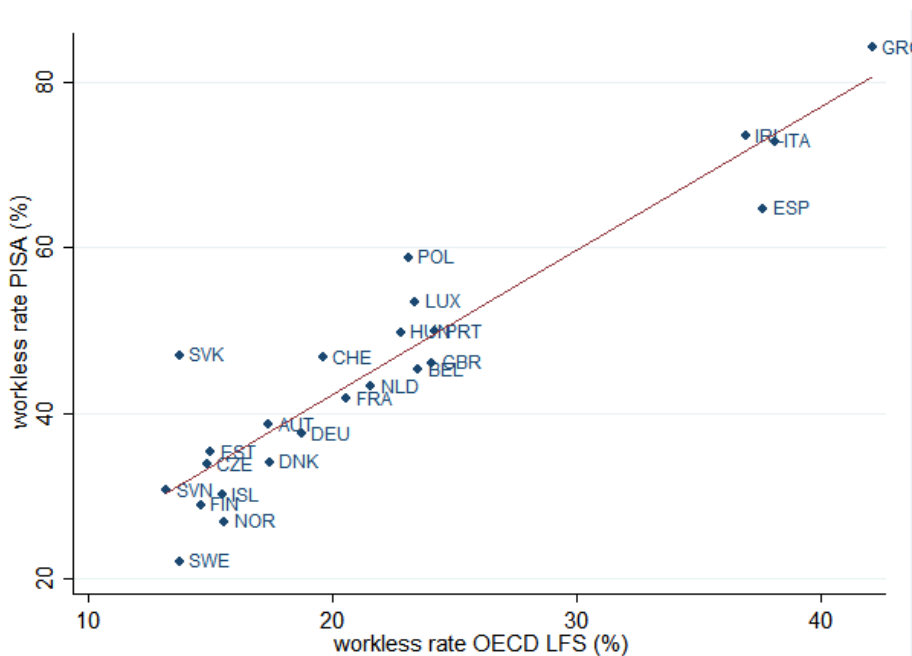
Figure A5: Jobless rates among fathers and mothers in PISA 2012 compared to OECD LFS 2012 for the extended sample

Fathers



Pearson correlation: 0.817 (p value: 0.000), Spearman rank: 0.798 (p value: 0.000). Jobless rate measured as $(1 - \text{employment} / \text{population ratio})$ in OECD LFS for men aged 40-44 in 2012. Jobless rate measured as fathers not working at the time of the survey in PISA.

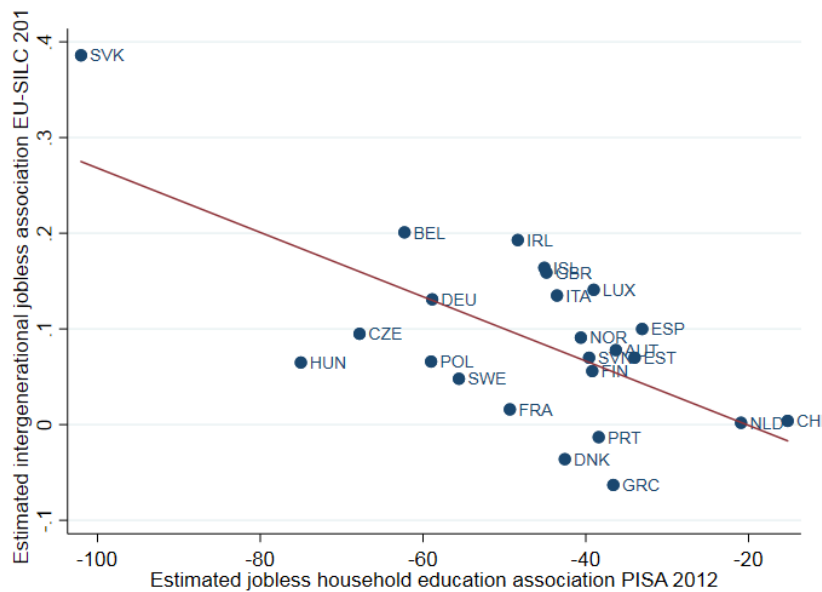
Mothers



Pearson correlation: 0.934 (p value: 0.000), Spearman rank: 0.841 (p value: 0.000). Jobless rate measured as $(1 - \text{employment} / \text{population ratio})$ in OECD LFS for women aged 40-44 in 2012. Jobless rate measured as mothers not working at the time of the survey in PISA.

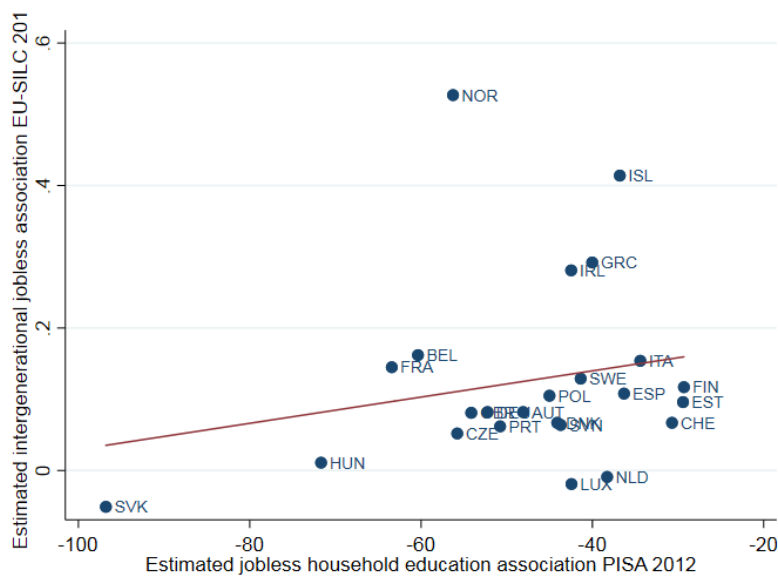
Figure A6: Relationship between intergenerational joblessness in the EU-SILC 2011 and experiencing a jobless household in childhood and maths associations in PISA 2012 for the extended sample

Sons



Pearson correlation: -0.644 (p value:0.001), Spearman rank: -0.544 (p value: 0.036)

Daughters

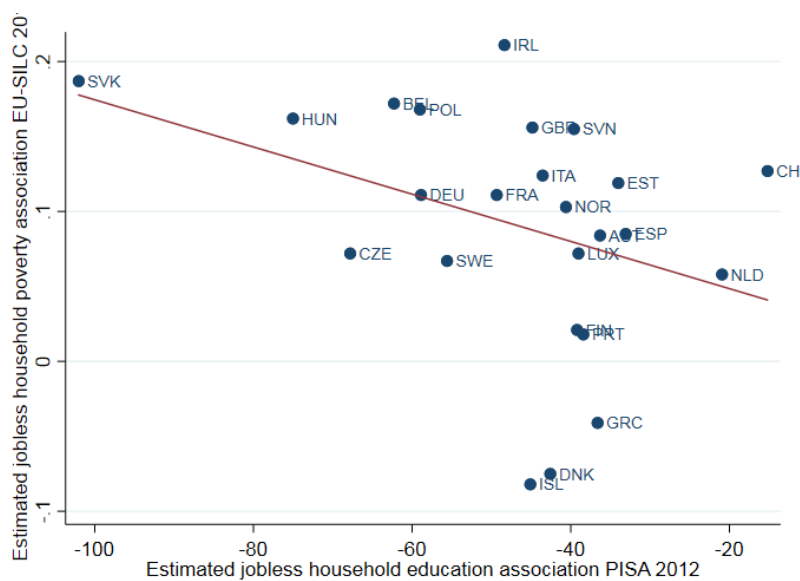


Pearson correlation: 0.209 (p value:0.328), Spearman rank: 0.218 (p value: 0.305).

EU-SILC estimated associations from country-specific regressions: probit of sons and daughters (estimated separately) spending a whole year jobless on an indicator experiencing a jobless household at 14, quadratic age controls for head of household and sons/daughters and a dummy for immigration status. Sample restricted to those reporting their head of household's main activity between 1981 and 2000 with a full 12 month activity history. Intergenerational unit weights applied. PISA estimate associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

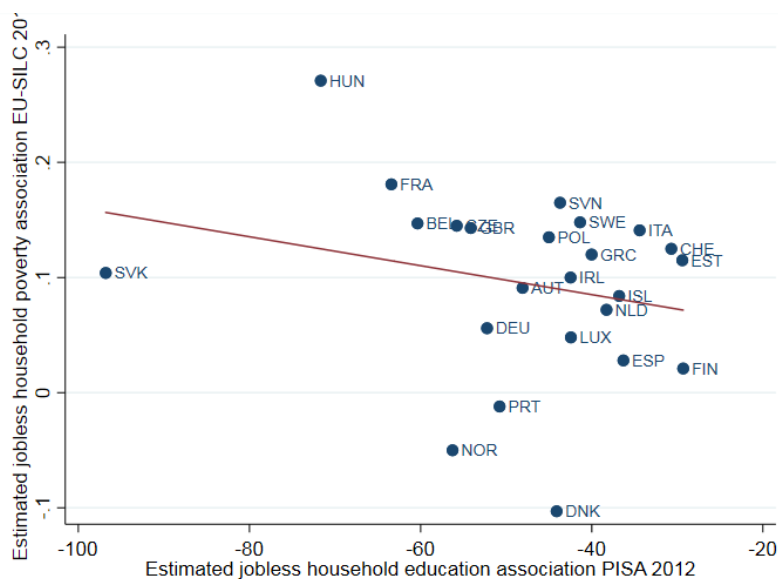
Figure A7: Relationship between experiencing a jobless household in childhood and adult poverty in the EU-SILC 2011 and experiencing a jobless household in childhood and maths associations in PISA 2012 for the extended sample

Sons



Pearson correlation: -0.362, (p value: 0.082) Spearman rank: -0.420 (p value: 0.041)

Daughters



Pearson correlation: -0.239 (p value: 0.260), Spearman rank: -0.277 (p value: 0.189)

EU-SILC estimated associations from country-specific regressions: probit of sons' and daughters' poverty indicator (measured as at or below the at-risk-of-poverty threshold, 60% of median equivalised disposable income after transfers) on an indicator of jobless household at 14, quadratic age controls for head of household and daughters and a dummy for immigration status. Sample restricted to those reporting the main activity of the parent(s) they lived with at 14 between 1981 and 2000 with information on equivalised disposable household income. Intergenerational unit weights applied. PISA estimate associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

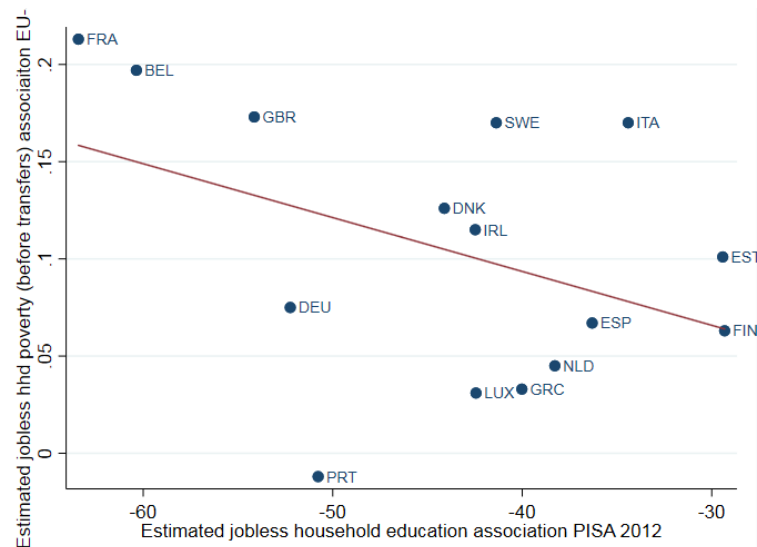
Figure A8: Relationship between experiencing a jobless household in childhood and adult poverty (before transfers) in the EU-SILC 2011 and experiencing a jobless household in childhood and maths associations in PISA 2012

Sons



Pearson correlation: -0.352, p value:0.198 Spearman rank: -0.329, p value: 0.232.

Daughters



Pearson correlation: -0.418, p value:0.121, Spearman rank: -0.429, p value:0.111. Norway excluded given extreme values based on small number of obs. See Table A3.

EU-SILC estimated associations from country-specific regressions: probit of sons' and daughters' poverty indicator (measured as at or below the at-risk-of-poverty threshold, 60% of median equivalised income before transfers) on an indicator of jobless household at 14, quadratic age controls for head of household and daughters and a dummy for immigration status, number of children in the household and average age of children in household. Sample restricted to those reporting the main activity of the parent(s) they lived with at 14 between 1981 and 2000 with information on equivalised household income. Intergenerational unit weights applied. PISA estimate associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

Table A1: Item non-response of intergenerational activity questions across countries for sons and daughters in the EU-SILC 2011

Country	Sons		Daughters	
	Missing mother' info	Missing fathers' info	Missing mothers' info	Missing fathers' info
Austria	1.1	0.4	0.6	0.2
Belgium	2.0	0.4	0.9	0.3
Czech Republic	0.8	0.1	0.9	0.0
Denmark	4.4	0.8	3.4	0.0
Estonia	0.4	0.4	0.7	0.6
Finland	7.1	2.6	6.1	3.3
France	1.2	1.1	1.6	0.7
Germany	0.5	1.5	0.8	2.5
Greece	0.1	0.7	0.1	1.6
Hungary	1.2	1.3	0.9	1.5
Iceland	0.4	0.9	0.4	1.3
Ireland	1.0	3.7	1.0	4.1
Italy	1.1	0.0	1.1	0.0
Luxemburg	1.1	0.6	0.7	0.0
Netherlands	1.0	0.1	0.4	0.3
Norway	1.1	1.1	1.0	2.1
Poland	1.0	0.7	1.2	0.4
Portugal	2.4	2.0	2.6	2.7
Slovak Republic	0.8	0.3	1.0	0.5
Slovenia	1.0	0.0	0.6	0.3
Spain	1.3	0.7	1.2	0.5
Sweden	0.5	1.0	0.6	0.9
Switzerland	0.9	0.9	0.8	1.7
UK	1.5	0.4	1.2	0.5

EU-SILC item non-response rates reported for male (sons) and female (daughters) respondents responses to questions PT130 'Activity Status of Father' and PT160 'Activity Status of Mother'. Coded as 0 if valid response given and 1 otherwise for all individuals who were age 14 between 1981 and 2000. Fathers' rates reported for those with fathers' present at that age. Intergenerational unit weights applied.

Table A2: Estimates of the relationship between children's maths scores and experiencing a jobless household in childhood across countries for sons and daughters in PISA 2012

Country	Sons'			Daughters'		
	Estimated coefficient	Standard error	N	Estimated coefficient	Standard error	N
Austria	-62.28	5.06	4127	-48.09	12.69	2316
Belgium	-67.80	10.90	2588	-60.36	6.22	4158
Czech Republic	-42.58	6.06	3537	-55.78	12.81	2653
Denmark	-34.01	9.44	2267	-44.11	6.74	3655
Estonia	-39.21	8.60	4239	-29.42	8.32	2335
Finland	-49.33	7.72	2130	-29.32	5.98	4274
France	-58.87	12.03	2039	-63.42	7.45	2304
Germany	-36.62	5.58	2451	-52.24	11.32	2067
Greece	-75.01	8.86	2209	-40.02	4.71	2536
Hungary	-45.10	12.04	1669	-71.67	9.59	2478
Iceland	-48.36	6.69	2435	-36.80	10.87	1679
Ireland	-43.54	5.27	15485	-42.48	4.58	2521
Italy	-39.03	8.11	2551	-34.41	4.18	15016
Luxemburg	-20.93	8.58	2225	-42.44	8.08	2509
Netherlands	-40.61	8.14	2282	-38.28	8.88	2085
Norway	-59.01	7.18	2101	-56.27	10.59	2227
Poland	-38.42	8.24	2745	-45.01	6.02	2307
Portugal	-102.02	7.96	2342	-50.77	6.93	2751
Slovak Republic	-39.60	9.04	3058	-96.79	8.30	2176
Slovenia	-33.08	4.25	12270	-43.71	8.37	2630
Spain	-55.59	10.38	2205	-36.31	4.21	12444
Sweden	-15.20	8.73	5481	-41.37	8.73	2289
Switzerland	-44.84	7.89	6148	-30.71	7.21	5477
UK	-36.31	10.35	2333	-54.14	6.80	6131

Estimated associations from country-specific regressions: OLS of sons' and daughters' (estimated separately) standardised maths score on an indicator of jobless household at time of survey and a dummy for immigration status. Standard PISA weights applied.

Table A3: Estimates of intergenerational joblessness across countries for sons and daughters in the EU-SILC 2011

Country	Sons'			Daughters'		
	Estimated marginal effects	Standard error	N	Estimated marginal effects	Standard error	N
Austria	0.078	0.06	1429	0.082	0.09	1637
Belgium	0.201	0.07	1501	0.162	0.05	1595
Czech Republic	0.095	0.08	1494	0.052	0.10	2040
Denmark	-0.036	0.08	563	0.067	0.10	619
Estonia	0.070	0.13	1286	0.096	0.11	1290
Finland	0.056	0.05	1120	0.117	0.08	1064
France	0.016	0.03	2563	0.145	0.05	2724
Germany	0.131	0.05	2353	0.082	0.06	2817
Greece	-0.063	0.08	1549	0.292	0.14	1561
Hungary	0.065	0.05	2774	0.011	0.11	3174
Iceland	0.164	0.15	413	0.414	0.27	399
Ireland	0.193	0.11	652	0.281	0.08	970
Italy	0.135	0.04	4969	0.154	0.05	5300
Luxemburg	0.141	0.11	1688	-0.019	0.05	1895
Netherlands	0.002	0.03	1326	-0.009	0.04	1490
Norway	0.091	0.14	693	0.527	0.36	596
Poland	0.066	0.05	3357	0.105	0.07	3794
Portugal	-0.013	0.05	1385	0.062	0.07	1483
Slovak Republic	0.386	0.22	1784	-0.051	0.10	1837
Slovenia	0.070	0.06	1274	0.064	0.06	1253
Spain	0.100	0.05	3616	0.108	0.06	3785
Sweden	0.048	0.06	747	0.129	0.09	813
Switzerland	0.004	0.02	1411	0.067	0.06	1728
UK	0.159	0.05	1357	0.081	0.04	1726

Estimated associations from country-specific regressions: probit of sons and daughters (estimated separately) spending a whole year jobless on an indicator of jobless household at 14, quadratic age controls for head of household and sons/daughters and a dummy for immigration status, number of children in the household and average age of children in household.. Sample restricted to those reporting their head of household's main activity between 1981 and 2000 with a full 12 month activity history. Intergenerational unit weights applied.

Table A4: Estimates of the association between adult poverty and experiencing a jobless household in childhood across countries for sons and daughters in the EU-SILC 2011

Country	Sons' Estimated marginal effects	Standard error	N	Daughters' Estimated marginal effects	Standard error	N
Austria	0.084	0.08	1504	0.091	0.08	1712
Belgium	0.172	0.08	1535	0.147	0.05	1638
Czech Republic	0.072	0.09	1530	0.145	0.09	2075
Denmark	-0.075	0.08	601	-0.103	0.09	693
Estonia	0.119	0.17	1311	0.115	0.12	1331
Finland	0.021	0.05	1221	0.021	0.04	1173
France	0.111	0.05	2614	0.181	0.06	2798
Germany	0.111	0.05	2547	0.056	0.04	2986
Greece	-0.041	0.07	1594	0.120	0.12	1601
Hungary	0.162	0.08	2857	0.271	0.10	3229
Iceland	-0.082	0.01	456	0.084	0.16	478
Ireland	0.211	0.10	679	0.100	0.04	1011
Italy	0.124	0.04	5144	0.141	0.04	5568
Luxemburg	0.072	0.07	1742	0.048	0.08	1943
Netherlands	0.058	0.06	1371	0.072	0.10	1552
Norway	0.103	0.18	725	-0.050	0.10	652
Poland	0.168	0.07	3402	0.135	0.07	3850
Portugal	0.018	0.05	1428	-0.012	0.04	1529
Slovak Republic	0.187	0.17	1845	0.104	0.14	1897
Slovenia	0.155	0.08	1356	0.165	0.09	1364
Spain	0.085	0.05	3769	0.028	0.05	3934
Sweden	0.067	0.08	789	0.148	0.10	898
Switzerland	0.127	0.03	1471	0.125	0.07	1796
UK	0.156	0.05	1383	0.143	0.04	1772

Estimated associations from country-specific regressions: probit of sons' and daughters' (estimated separately) poverty indicator on an indicator of jobless household at 14, quadratic age controls for head of household and sons/daughters and a dummy for immigration status. Sample restricted to those reporting their head of household's main activity between 1981 and 2000 and reporting an equalised disposable household income (after transfers). Intergenerational unit weights applied.

Table A5: Estimates of the association between adult poverty (before transfers) and experiencing a jobless household in childhood across countries for sons and daughters in the EU-SILC 2011

Country	Sons' Estimated marginal effects	Standard error	N	Daughters' Estimated marginal effects	Standard error	N
Austria	0.101	0.09	1504	0.005	0.08	1712
Belgium	0.213	0.08	1535	0.197	0.05	1638
Czech Republic	0.108	0.10	1530	0.253	0.10	2075
Denmark	-0.101	0.07	601	0.126	0.20	693
Estonia	0.137	0.18	1311	0.101	0.12	1331
Finland	0.069	0.07	1221	0.063	0.06	1173
France	0.053	0.04	2614	0.213	0.06	2798
Germany	0.096	0.05	2547	0.075	0.05	2986
Greece	-0.044	0.07	1594	0.033	0.09	1601
Hungary	0.294	0.10	2857	0.204	0.09	3229
Iceland	0.027	0.12	456	0.215	0.18	478
Ireland	0.252	0.10	679	0.115	0.06	1011
Italy	0.156	0.04	5144	0.170	0.05	5568
Luxemburg	0.062	0.07	1742	0.031	0.08	1943
Netherlands	0.024	0.06	1371	0.045	0.10	1552
Norway	0.676	0.23	725	-0.083	0.05	652
Poland	0.136	0.07	3402	0.185	0.07	3850
Portugal	0.103	0.07	1428	-0.012	0.04	1529
Slovak Republic	0.204	0.17	1845	0.110	0.14	1897
Slovenia	0.082	0.07	1356	0.164	0.09	1364
Spain	0.165	0.06	3769	0.067	0.05	3934
Sweden	0.115	0.10	789	0.170	0.11	898
Switzerland	0.120	0.06	1471	0.101	0.06	1796
UK	0.185	0.06	1383	0.173	0.05	1772

Estimated associations from country-specific regressions: probit of sons' and daughters' (estimated separately) poverty indicator on an indicator of jobless household at 14, quadratic age controls for head of household and sons/daughters and a dummy for immigration status. Sample restricted to those reporting their head of household's main activity between 1981 and 2000 and reporting an equalised household income (before transfers). Intergenerational unit weights applied.