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Intergenerational Social Mobility

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ABSTRACT/RESUMÉ

Intergenerational social mobility

This paper assesses recent patterns in intergenerational social mobility across OECD countries and examines the role that public policies can play in affecting such mobility. It shows that the relationship between parental or socio-economic background and offspring's educational and wage outcomes is positive and significant in practically all countries for which evidence is available. Intergenerational social mobility is measured by several different indicators since no single indicator provides a complete picture. However, one pattern that emerges is of a group of countries, *e.g.* southern European countries and Luxembourg, which appears to rank as relatively immobile on most indicators, while another group, *e.g.* Nordics, is found to be more mobile. Furthermore, public policies such as education and early childcare play a role in explaining observed differences in intergenerational social mobility across countries. In addition, this study also finds a positive cross-country correlation between intergenerational social mobility and redistributive policies.

JEL classification: J60; J62; I20; H23; C20; C21.
Keywords: intergenerational wage mobility; intergenerational education mobility; education; public policies.

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Mobilité sociale intergénérationnelle

Cet article examine les tendances récentes de la mobilité sociale intergénérationnelle dans les pays de l'OCDE et analyse rôle joué dans ce contexte par les politiques publiques. On observe, dans la quasi-totalité des pays pour lesquels les données sont disponibles, une relation positive et significative entre l'origine sociale et familiale et le niveau d'éducation et/ou de salaire d'un individu. La mobilité sociale intergénérationnelle est ici mesurée au travers d'une batterie d'indicateurs, parce qu'il n'existe pas d'indicateur unique permettant d'apprécier les phénomènes de persistance entre générations. Néanmoins l'analyse met clairement en évidence l'existence de deux groupes de pays: d'un coté les pays du Sud de l'Europe et le Luxembourg, où l'on mesure une faiblesse relative de la mobilité sociale intergénérationnelle, et ce quel que soit l'indicateur utilisé, et de l'autre les pays Nordiques, où l'on mesure une réalité inverse. De plus, l'article montre que certaines politiques, telles que les politiques éducatives et scolaires ou les politiques liées à la petite enfance, peuvent affecter la mobilité sociale entre générations. L'analyse empirique met également en évidence une association positive entre les politiques de redistribution du revenu et la mobilité sociale intergénérationnelle.

Classification JEL : J60 ; J62 ; I20 ; H23 ; C20 ; C21.
Mots Clés : mobilité sociale intergénérationnelle des salaries ; mobilité sociale intergénérationnelle de l'éducation ; éducation ; politiques publiques.

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INTERGENERATIONAL SOCIAL MOBILITY

By Orsetta Causa and Åsa Johansson[1]

Introduction and main findings

1. This paper assesses recent patterns in intergenerational social mobility across OECD countries and examines the role that policies can play in affecting such mobility. Intergenerational social mobility refers to the relationship between the socio-economic status of parents and the status their children will attain as adults. A society can be deemed to be more or less mobile depending on whether this relationship is, on average, looser or tighter: in a relatively immobile society an individual's wage, education or occupation will tend to be strongly related to those of his/her parents. Intergenerational mobility reflects a host of factors, including inherited traits, social norms and public policies that may influence the individual willingness and ability to seize economic opportunities. These factors are difficult to unbundle precisely and, as regards norms and policies to some extent they reflect societal choices over institutional settings, as well as differences in choices over redistribution and equity, which are likely to be valued differently across countries. Therefore, in cross-country comparisons there is no "benchmark" mobility level that can be identified.

2. Nonetheless, removing policy-related obstacles to social mobility can be advocated on both equity and efficiency grounds because it can improve both equality of economic opportunities and the way a society allocates human resources to their best use. Promoting intergenerational social mobility in this way means providing individuals with the same opportunities *ex-ante*, even though it does not imply that *ex-post* all individuals should achieve the same outcomes. Furthermore, policies that affect social mobility are also closely related to growth concerns. From a dynamic perspective, the ability of an economy to continuously allocate human resources to their best use can have important effects on economic performance. However, trade-offs can exist between policies that remove obstacles to social mobility and those aimed at strengthening other drivers of growth. Therefore, understanding the role played by public policies *vis-à-vis* social mobility can help designing policy mixes that enhances equality of opportunity without any adverse effects on economic growth or even allow enhancing both drivers of growth and equality of economic opportunities across generations.

3. The socio-economic status of parents can influence that of their children in two main ways: by directly affecting their labour productivity and labour market attachment, as well as by indirectly facilitating their success on the labour market by other means (*e.g.* by the transmission of social norms such as work ethics or the legacy of social networks that help labour market insertion). In turn, labour productivity of children is to a large extent determined by parent's investment in their human capital and

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children's own ability to seize educational opportunities. One empirical challenge is to separate the direct productivity channel from other indirect ones. Arguably, both channels can be influenced by public policies, *e.g.* education, redistributive and labour or product market policies.

4. Intergenerational transmission of social status is usually measured as "wage or income persistence", *i.e.* the fraction of parental income or wages that is reflected on their offspring's income or wages. Measuring and comparing wage or income persistence across countries is made difficult by the lack of comparable cross-country data on wages, especially of parents. Against this background, and given that education is a key transmission mechanism in generating intergenerational social mobility and promoting the matching of skills with societal needs, this paper focuses primarily on the role of education as a driver of mobility across generations. In particular, the empirical analysis focuses on the following concepts of mobility:

- The influence of parental background, as measured by educational achievement of parents, on wages and educational attainment of various cohorts of adults.

- The influence of parental background, as measured by a composite index of their socio-economic status, on cognitive achievements of 15-year old students.

The analysis draws on both existing and new evidence based on two main sources of individual level information: wage and adult education mobility is studied using the 2005 SILC poverty module of Eurostat's survey data; the influence of parental background on a teenager's cognitive achievement is studied using the 2006 OECD Programme for International Student Assessment (PISA) survey data. Though none of these concepts of mobility refer to intergenerational transmission of wages proper, the estimated persistence/mobility measures will be called "wage persistence/mobility" and "education persistence/mobility", respectively.

5. The paper is organised as follows. First, it describes the linkages between family background and wage and education outcomes of individuals, explaining the role of education in determining wage mobility. Second, it analyses the extent of intergenerational wage and educational mobility across those OECD countries for which data are available. Finally, in light of these mobility patterns, the last section uses the same data sources to investigate the cross-country association between a range of public policies - including education, redistributive and labour and product market ones – and social mobility and equality of opportunity across generations. Suggestive evidence is also provided that the main channel through which some of these policies may influence social mobility is *via* the link between cross-sectional inequality and intergenerational wage mobility.

Main findings

Mobility patterns

6. In this study intergenerational social mobility is measured by several different indicators (*e.g.* wage persistence, secondary and post-secondary education persistence). However, given the complex nature of social mobility, these various indicators do not necessarily provide the same cross-country ranking, suggesting that no single indicator provides a complete picture of intergenerational social mobility.

- The influence of parental background on individual earnings varies widely across OECD countries for which estimates are available. Low mobility across generations, as measured by a close link between parent's and children's earnings, is particularly pronounced in the United

Kingdom, Italy, the United States and France, while mobility is higher in the Nordic countries, Australia and Canada.

- Across European OECD countries covered by the analysis there is a substantial wage premium associated with growing up in a higher-educated family, whereas there is a penalty with growing up in a less-educated family, even after controlling for a number of individual characteristics. The premium and penalty are particularly large in southern European countries, as well as in the United Kingdom. The penalty is also high in Luxembourg and Ireland. For example, in these countries the wage premium is more than 20%, while the penalty is some 16% or more. In general, wage persistence across generations, measured as the difference between the wage premium and penalty, is slightly stronger for sons than for daughters.

- The influence of parental socio-economic status on students' achievement in secondary education also differs across OECD countries. It is particularly strong in the United States, France and Belgium, while it is weaker in some Nordic countries, as well as Korea and Canada. In over half of the OECD countries, including all the large continental European ones, students' cognitive skills are more strongly influenced by the average socio-economic status of parents of other students in the same school, *i.e.* the schools' average socio-economic environment, than by their own parents' socio-economic status.

- Inequalities in secondary cognitive skills are likely to translate into inequalities in post-secondary educational achievement and subsequent wage inequality in the labour market. Indeed, there is a positive probability premium of achieving tertiary education associated with coming from a higher-educated family, while there is a probability penalty associated with growing up in a less-educated family across European OECD countries. The increase in the probability of achieving tertiary education is particularly strong in Luxembourg, Italy, Finland and Denmark where it is 30 percentage points higher for a son whose father had tertiary education compared to a son whose father had upper-secondary education. Furthermore, transmitted inequalities in adult education are positively associated across countries with inequalities in wages.

- In all European OECD countries covered by the analysis there is also persistence in below-upper secondary education. The probability of achieving below-secondary education is on average 18 percentage points higher for children whose father had below-upper secondary education compared to those whose father had upper-secondary education. Conversely, the probability to achieve below upper-secondary education decreases on average by 10 percentage points for offspring of tertiary educated fathers compared to children whose father had upper-secondary education.

Intergenerational mobility and inequality

- Intergenerational social persistence, as measured by a close link between parental education achievement and children's wages, is correlated across countries with cross-sectional inequality and poverty. Also, the association between parental socio-economic status and teenager's cognitive achievement is stronger in countries with a greater share of children living under the poverty line or lacking basic material resources.

- Labour market institutions which tend to compress wage distributions, such as a higher degree of unionisation and a greater coverage of collective wage agreements, appear to be associated with a looser link between parental educational achievement and children's wages.

Policies and mobility

- Higher enrolment in child care and early childhood education correlate with a lower influence of parental socio-economic background on a teenagers' cognitive skills, thereby suggesting a positive effect on social mobility. These policies are likely to be most efficient when they are targeted to children from low-income and/or second-language families.

- Educational and school practices that group students into different programmes or curricula according to proficiency level, for instance early tracking and ability grouping within classes, correlate with a stronger influence of parental socio-economic background on teenagers' cognitive skills. This reflects a stronger influence of the school socio-economic environment on a student's performance in the case of early tracking practices.

- By contrast, a better matching of school resources with needs, as well as a steeper progression in teachers' wages over their career are associated with a lower influence of parental background on students' achievement, possibly by attracting experienced teachers to disadvantaged areas. Likewise, a larger share of qualified teachers on the school's staff correlates with lower inequalities transmitted by family background.

- Evidence suggests that increasing the social mix within schools may increase performance of disadvantaged students with neutral or in some cases with positive effects on overall performance. Thus, policies aimed at encouraging such mix in neighbourhoods may, therefore, play a role in mitigating inequalities.

- There is suggestive evidence that universal government-supported loan systems for tertiary education are associated with higher social mobility, as measured by the probability for the offspring of disadvantaged families to complete tertiary educational studies. This could reflect that in countries lacking such systems financial constraints could be an obstacle to achieving tertiary education for students from disadvantaged backgrounds.

- More progressive income taxation and higher short-term unemployment benefits are associated with a looser link between parental background and both teenager's cognitive skills and wages. This may reflect the tendency of well-targeted redistributive and income support policies to lower cross-sectional income inequality and poverty rates.

- Easier employment protection for regular contracts correlates with a looser link between parental educational background and children's wages in European OECD countries. By contrast, easier product market regulation correlates with a tighter such link, suggesting lower mobility across generations in countries where policies are conducive to stronger competitive pressures. The empirical analysis does not allow straightforward explanations for these results, and only conjectures are possible. One conjecture is that they reflect opposite effects of these policies for cross-sectional wage inequality and thereby social mobility.

Determinants of intergenerational social mobility

The linkages between parental background and their offspring's outcomes

7. Intergenerational social mobility refers to the relationship between the socio-economic status of parents and the status their children will attain as adults. This status can be measured in several ways, by income, education, occupation or social class. More often economic research has focused on some measure

of income or wages.[2] Usually, studies assessing the association between parent's and offspring's incomes focus on pairs of fathers and sons. Ideally, income should be measured by a household's disposable income as this most directly influences the standard of living of individuals (*e.g.* Chadwick and Solon, 2002; Solon 2004; Lee and Solon, 2006). In practice, accurate measurement of a household's disposable income is difficult as it should take into account the structure of the household, the extent of female participation in the labour market, as well as the different sources of income (*e.g.* earnings, assets, welfare). Therefore, most existing studies use some measure of wages (Box 1). The extent to which the offspring's wage levels reflect those of their parents (the so-called "intergenerational wage elasticity") is taken as a measure of wage persistence across generations or lack of intergenerational wage mobility. The higher this elasticity, the lower is intergenerational wage mobility. However, one difficulty in adopting this approach in a cross-country context is that comparable information on wages of parents is seldom available.

8. Parental background can influence their offspring's wages in various ways (Figure 1). In very general terms, parental background can affect these wages by boosting both the offspring's labour productivity and their successful insertion in the labour market. One way in which children's productivity, and hence their future incomes, can be enhanced is through the ability of parents to invest in their offspring's human capital. However, wealth and assets passed on from one generation to another, the inheritance of traits that are important for economic success, such as propensities to undertake education, work ethics and risk-related behaviours, as well as local conditions such as growing up in advantaged neighbourhoods are other important factors explaining the transmission of income across generations (for an overview see d'Addio, 2007).

9. One empirical challenge is to separate the direct productivity channel from other indirect labour market ones. Another more fundamental challenge is to empirically isolate the effect of parental background ("nurture") from that of genetic inheritance of abilities ("nature") on individuals' wages and educational achievement. In general, as in this study, estimates of the impact of parental background on individuals' wages and educational achievement combine these two effects. The relative importance of "nature" versus "nurture" in explaining intergenerational social mobility is far from established (*e.g.* Sacerdote, 2002; Bowles *et al.* 2002; Plug and Vijverberg, 2005). However, to the extent that genetic inheritability of ability does not vary systematically across countries, such heritability should not influence cross-country variation in wage or educational mobility.

[Figure 1: Some links between parental background and their offspring's outcomes]

10. An important part of wage persistence across generations is driven by the effect of parental background on cognitive skills acquired by their children in formal (and informal) education (which influences the offspring's productivity). This includes prominently secondary education and post-secondary educational attainment (Figure 1 and Box 2). Indeed, recent studies show that there is a clear connection between intergenerational wage mobility and intergenerational educational mobility, although educational mobility cannot account for all the estimated persistence in incomes (Blanden, 2008a; Blanden, *et al.* 2005; Solon 2004). Educational differences tend to persist across generations and differences in such persistence explain a large share of the cross-country variation of intergenerational wage correlations (*e.g.* Solon, 2004; Blanden *et al.* 2006; Blanden *et al.* 2005; d'Addio, 2007). The extent to which education is

2 Economists typically analyse income or wage/earnings mobility, while sociologists focus on mobility across social class and occupations (*e.g.* Erikson and Goldthorpe, 1992 for an overview of social class mobility). One advantage with measuring intergenerational mobility by class or occupation is that data restrictions are much less stringent, retrospective information of parent's occupation being more widely available than information about their incomes, wages or earnings. But, a disadvantage is that it is difficult to make international comparisons of social class and occupation since they may have very different meanings across countries.

responsible for intergenerational persistence in wages depends on how strongly educational achievement is tied to family background, that is the degree of persistence in education. Of course, the intergenerational wage link is also affected by the returns to education in the labour market (*e.g.* Solon, 2004; d'Addio, 2007).[3] It is likely that inequalities in cognitive skills acquired in secondary education translate into inequalities in achieving post-secondary education and into wages via the returns to education in the labour market.

Box 1. Concepts in intergenerational social mobility

Measures of intergenerational income mobility are often based on empirical estimation of the intergenerational income elasticity, β, which measures the extent to which offspring's income levels, Y_i, reflect those of their parents, Y^P_i, that is:

$$\ln Y_i = \alpha + \beta \cdot \ln Y_i^P + \varepsilon_i$$

This estimated elasticity is a measure of average intergenerational income persistence. A low value implies that the intergenerational link between parents' and offspring's incomes is relatively weak while a high value implies a relatively strong link. An alternative measure is the partial correlation between parents' and offsprings' incomes, which adjusts for potential differences in the variance of income between the two generations.

Theoretical studies of intergenerational mobility regard long-run permanent disposable income as the most appropriate income concept (*e.g.* Goldberger, 1989; Chadwick and Solon, 2002; Solon 2004; Lee and Solon, 2006; Haider and Solon 2006). But empirical studies often use some measure of wages. Basing estimates of persistence across generations on current wages raises some key issues (Solon 2002). First, measuring permanent income/wages of parents' with error leads to inconsistent estimates causing an underestimation of the true intergenerational elasticity. Second, using current wages of offsprings as proxy for lifetime income can also cause a bias in the estimates, in particular when looking at individuals at the beginning of their careers (Haider and Solon, 2006). Studies based on such measures of offsprings' wages tend to find lower elasticity estimates than studies measuring wages further along their careers or life cycles. To partly overcome these problems, many studies average both parental and offspring wages over several years or measure offspring's wages after a few years experience in the labour market.

Educational persistence is often measured by the correlation between years of schooling or educational achievement of parents and their offspring. However, basing educational persistence on years of schooling has some shortcomings. It assumes that the impact on human capital of an additional year of schooling is the same across generations and that years of schooling affect human capital in the same way across countries. These problems are overcome by studies that assess educational mobility in terms of qualification or literacy levels achieved, as measured for instance by the harmonised cross-country ISCED classification (*e.g.* Chevalier *et al.* 2007) or by test scores of cognitive skills (OECD 2007a; Hertz *et al.* 2007).

11. Aside from the above-mentioned effects of own parental background, persistence in wages across generations also appears to be positively associated across countries with measures of inequality, *i.e.* of the dispersion of parental backgrounds (see below and *e.g.* d'Addio, 2007 for an overview). Although causality between intra- and inter-generational persistence of inequality is far from established, it is, therefore, possible that redistributive policies and institutions that narrow the gap between current incomes and/or wages of parents could also mitigate the influence of parental background on wages and educational outcomes of their offspring.

3 There is ample evidence of sizeable returns to education, both to years of schooling and cognitive achievement (*e.g.* Card 1999; Oliveira *et al.* 2007). Furthermore, the returns to changes in qualitative measures of education, for example test scores on cognitive achievement, seem to be higher than those from additional years of schooling (Bishop, 1992; Riviera-Batiz, 1992).

12. The empirical approach developed in the remainder of this paper has been partly shaped by the above considerations. In view of the crucial role played by education in wage persistence across generations and of data limitations in a cross-country context, the analysis of wage mobility measures parental background by fathers' education and their offspring's incomes as gross hourly wages.[4] Basing the estimation of persistence on gross hourly wages implies that the persistence measure can be thought to reflect the impact of parental education on productivity. Instead, basing persistence estimates on monthly or annual wages would in addition to the productivity effect capture the labour supply decision, *i.e.* the decisions on working hours.

13. Moreover, the study of wage mobility is supplemented by the analysis of educational mobility for both teenagers, with parental background measured by a broad index of the family's socio-economic status and educational outcomes measured by PISA test scores, and adults, with parental background measured by father's education and offspring educational outcome measured by educational attainment. Finally, the analysis of policy influences on wage and educational mobility focuses on both education and other policies that are likely to affect cross-sectional inequality.

Box 2. Education as a determinant of intergenerational social mobility

Several recent studies analyse the link between intergenerational persistence in education and income (*e.g.* Solon 2004). In these studies the offspring's investment in education, which drives intergenerational income mobility, depends on family income.

Educational attainment varies with parental income due to both differing endowments (heritability of income-related traits such as propensities to undertake education and work ethics) and differing private investment in education across families. If all families had full access to perfect capital markets, only inheritable traits would influence mobility (Becker and Tomes, 1979). But if parents cannot borrow against their children's future earnings to finance their education, liquidity-constrained parents will invest sub-optimally in their children's education (Becker and Tomes 1986; Grawe and Mulligan 2002). Additionally, parental investment in education is increasing in the return to human capital investment, since parents are more inclined to invest in their children's education when the payoff is higher. Thus, wealthier families tend to invest more in their children's human capital and such investment is increasing in labour market returns (Solon, 2004).

Some of these studies suggest that government spending on education can increase intergenerational mobility (Solon, 2004; Mayer and Lopoo, 2008). Progressive public investment in education can offset sub-optimal parental investment in education, to the extent that the offspring of liquidity-constrained parents benefit relatively more from these public programmes. A recent study for the United States shows that intergenerational mobility is greater in high-spending states compared to low-spending states (Mayer and Lopoo, 2008).

In sum, intergenerational income mobility tends to be lower in the presence of greater heritability of income-related traits, and higher returns to human capital, as well as less progressive public investment in human capital.

[4] The wage concept in this study refers to gross hourly wages and it is based on new comparable micro data across European OECD countries, the EU-SILC database. Gross hourly wages are based on wages and salaries paid in cash for time worked in main and any secondary job including holiday pay and any additional payments during the year preceding the interview. This is brought to an hourly basis by using the number of hours the person normally works in his/her main job, including overtime. Admittedly, using hours worked in the main job may lead to an over-estimation of hourly wages for persons with two or more jobs. Moreover, only wage earners are covered. This may potentially exaggerate the degree of intergenerational wage mobility, to the extent that the offspring of higher-educated families are less likely to be inactive than the offspring of low-educated families.

Intergenerational social mobility patterns

Cross-country patterns in intergenerational income mobility

Intergenerational income persistence is significant in all OECD countries

14. The relationship between socio-economic status of parents and their offspring is positive and significant in practically all countries for which evidence is available, and for many different aspects of social status (*e.g.* Hertz *et al.* 2007; Corak 2004). International comparisons of intergenerational income persistence are relatively common (*e.g.* Solon 2002; Corak, 2006; d'Addio, 2007). However, these comparisons can be treacherous, because different studies use different variable definitions, samples, estimation methods and time periods.

15. Taking the available estimates at face value, cross-country comparison of intergenerational income elasticities based on (various measures of) earnings for pairs of fathers and sons suggests that persistence is higher in the United Kingdom, Italy, the United States and France among the OECD countries for which comparable estimates are available (*e.g.* Corak, 2006; Blanden, 2008b).[5] In these countries at least 40% of the economic advantage high-earnings parents have over low-earnings parents is passed on to the next generation (Figure 2). By contrast, intergenerational persistence is comparatively low in the Nordic countries, Australia and Canada, with less than 20% of the earnings advantage being passed on from parent to offspring.

[Figure 2: Intergenerational earnings elasticity: Estimates from various studies]

16. These patterns of intergenerational persistence are partly confirmed by descriptive evidence based on new comparable data for European OECD countries, which allow systematic comparison of sons' wages to the educational attainment of fathers (Box 3). In all the countries covered by the data, a son is much more likely to be in the top wage quartile if his father had achieved tertiary education compared to a son whose father had only basic (below upper-secondary) education, particularly in Portugal, Luxembourg and the United Kingdom (Figure 3).[6]

[Figure 3: Ratio of the chance of being in the top wage quartile for sons of higher-educated vs. lower-educated fathers]

5 There is very little evidence concerning the intergenerational income persistence for women across OECD countries. This neglect partly reflects that in economies where women's labour force participation rates are lower than men's, their wages may be an unreliable indicator of their economic status. In the United States, income persistence for daughters is found to be somewhat weaker than for sons, but it is still rather substantial (Chadwick and Solon, 2002).

6 Across all European OECD countries covered by the analysis, there is also substantial persistence in wages of pairs of fathers and daughters. This finding is robust to the use of mother's education instead of father's education.

Box 3. Measuring the link between parental educational background and their offspring's wages

The analysis is based on the 2005 module on the intergenerational transmission of poverty of the EU-SILC household database. This poverty module contains retrospective information on parental background when the respondent was a teenager for a selected set of respondents. This information is comparable across European OECD countries and includes family composition, age, educational qualification level, activity status and occupation of mother and father, as well as an indicator of financial distress conditions. However, information on parents' wages is lacking.

The approach taken in this study is to proxy parental background by the highest educational qualification level achieved by the father according to the International Standard Classification of Education (ISCED). One advantage of using father's education as a proxy for his income is that education is likely to be a more permanent feature than current wages, while being highly correlated with wages in most countries. The offspring's income concept refers to gross hourly wages and salaries paid in cash for time worked or for time not worked, such as holidays, as well as additional payments (*e.g.* overtime payments, monetary bonuses etc). Henceforth, this will be referred to as wages. The results focus on two cohorts of offspring (35-44 and 45-54) and their parents. The youngest cohort (25-34 years old) is excluded because of the potential difficulties associated with measuring permanent wages/incomes at young ages, as discussed in Box 1, as well as to ensure that the individuals under consideration have reached their desired educational level.

17. To explore more fully this descriptive evidence through regression analysis, it was assumed that individual wage prospects depend on father's educational attainment in two main ways: first, through the direct transmission of factors that affect the economic success of their offspring; second, through influencing their offspring's educational attainment. (Box 4). The first channel, that is estimates of parameter *a* in equation (1) Box 4, captures for instance the transmission of wealth, work ethics and social norms or social networks that facilitate successful labour market insertion. The second channel, *i.e.* estimates of parameter *b* in equation (1) Box 4, captures access to education, as well as the individual propensity to acquire education and genetically transmitted abilities to learn, which ultimately affect an individual's productivity (*e.g.* Bourguignon *et al.* 2003). As a first step in the analysis, Figure 4 reports estimates of the overall effect of a father's educational attainment on their offspring's wages, estimates of parameter *f* in equation (3) Box 4, with no distinction between these channels.

[Figure 4: Wage premium and penalty due to paternal education levels]

Box 4. The influence of parental background on their offspring's wages

The empirical strategy for assessing the influence of parental background on their offspring's wages assumes that gross hourly wages (W_i) depend on both the offspring's own effort or educational attainment (EC_i) and the influence of father's educational attainment (E,) (for details see ECO/CPE/WP1(2009)4/ANN3):

$$\ln W_i = k + a \cdot E_i + b \cdot EC_i + \varepsilon_{i1}, \qquad (1)$$

where *a* measures the strength of the direct influence of father's educational attainment on wages (e.g. through the transmission of social norms, work ethics, social networks and other factors facilitating the economic success of children) and *b* the offspring's labour market returns to their educational attainment.

In turn, the offspring's educational attainment is assumed to depend on their fathers' educational attainment, reflecting for instance the ability and willingness of fathers to invest in their offspring's human capital as well as other inheritable factors affecting the ability of their children to seize educational opportunities, such that

$$EC_i = j + d \cdot E_i + \varepsilon_{2,i} \quad (2)$$

Combining these two equations yields,

$$\ln W_i = e + f \cdot E_i + \varepsilon_{i3} \quad (3)$$

where *f = (a + bd)* captures the total effect of father's educational attainment on individual wages. This effect is decomposed in a direct effect on wages (*a*) and an indirect effect through education (*bd*), which in turn consists of the returns to offspring's own education (*b*) and the influence of father's educational attainment on their offspring's educational attainment (*d*).

In the first stage, the total effect of fathers' educational attainment on individual wages, equation (3), is estimated for various cohorts of men and women (Table 1, column 1). The estimation controls for "Mincerian" individual characteristics such as living in urban/rural area, migrant and marital/cohabitant status. The results are robust to inclusion of age and experience.[1] Ordinary least squares (OLS) estimates of equations (1) and (3) may be biased due to non-random selection into employment since it is likely that those who are not working constitute a self-selected sample, particularly for women that would earn low wages. To overcome this selection problem, this study uses the Heckman sample selection bias estimator for women and OLS for men (*e.g.* Heckman, 1976). However, results for women remain broadly the same under OLS or Heckman estimation techniques.

In the second stage, estimation of equation (1), offspring's educational attainment is introduced as an additional explanatory variable in order to find out whether fathers' educational attainment mainly influences their offspring's wages through their influence on offspring's education or if it has a direct effect on wages, over and above the effect via education (Table 1, column 2).[2]

[Table 1: The influence of father's educational attainment on son's wage]

In the third stage, the influence of fathers' educational attainment on their offspring's educational attainment is explicitly estimated, equation (2). The empirical results are obtained by estimating an Ordered Probit model, in which observed educational outcomes of individuals (EC_i) are assumed to be driven by an underlying continuous variable measuring their "propensity to achieve education". This underlying variable is assumed to be determined by their father's educational attainment (E_i) and a number of individual characteristics. The results suggest that in all European OECD countries father's educational attainment influences their offspring's educational attainment (Table 2 and ECO/CPE/WP1(2009)4/ANN3).

[Table 2: The marginal effect of father's education on the probability to achieve a certain level of education]

1. In "Mincerian" wage equations, age, experience and experience squared are standard controls. Life-cycle effects are not considered in the final estimates because they are not statistically significant in the current setting, due to weak identification within narrowly defined age groups (or cohorts).

2. It is possible that there is a potential endogeneity of own education in this specification due to unobserved variables such as ability and or motivation which may be correlated with both education and wages. This would result in an upwards bias of the influence of own education on wages. Usually, instrumental variable estimation (IV) is used to address this problem, but it is often difficult to find appropriate instruments, and weak instruments may bias the results further. Indeed, studies using IV-estimations often tend to find even higher estimates of the influence of education on wages than OLS, which suggests that measurement error in the education variable might be a more serious problem than endogeneity (*e.g.* Card, 2001).

Wage premium or penalty depending on father's educational attainment

18. In all European OECD countries covered by the analysis, there is a positive wage premium (measured as the increase in gross hourly wages) for offspring of higher-educated fathers, while there is a penalty (measured as the decrease in gross hourly wages) for offspring of lower-educated fathers (Figure 4). The wage premium is particularly large in southern European OECD countries, the United

Kingdom and Finland.[7] In these countries, having a father with tertiary education raises sons' wages by some 20% or more compared to a son whose father had upper-secondary education. At the same time, the wage penalty of having a father with only basic education compared to a father with upper-secondary education appears to be high in the same countries, as well as in Luxembourg and Ireland. In these countries, the wage of a son whose father had below upper-secondary education falls short by more than 16% of the wage of a son whose father had upper-secondary education.[8] The influence of paternal background on daughters' wage premia is, in general, slightly lower than that of sons. However, it is still substantial. Moreover, for women, the average wage penalty of coming from a disadvantaged background is sometimes much higher than the premium of coming from an advantaged background.

Summary measure of persistence in wages

19. One way of summarising the extent of wage persistence across generations is to measure the gap between the estimated wage premium and penalty of having a tertiary-educated or below upper-secondary educated father, respectively. A greater gap would imply stronger persistence in wages over generations. According to this measure, intergenerational wage persistence for sons is particularly strong in some southern European countries, and in the United Kingdom, while it is lower in some Nordic countries, Austria and Greece (Figure 5). The cross-country ranking of persistence in wages for women is similar to that of men. However, wage persistence for women is lower than for men in the United Kingdom, while it is higher in Spain, Greece, Ireland, and Austria (for details see see Causa *et.al.* 2009).

[Figure 5. Summary measure of wage persistence]

20. The cross-country distribution of the wage persistence estimates could be influenced by differences in the country-specific distributions of father's educational attainment levels and offspring's wages. For instance, it is possible that the wage premium of having a higher-educated father is greater in countries where the proportion of higher-educated fathers (relative to the reference category of fathers with upper-secondary education) is relatively low, as for example in Portugal. This could possibly reflect scarcity rents. One way of accounting for this is to adjust the estimated wage persistence for cross-country differences in the dispersion of father's education and their offspring's wages.[9] After this adjustment, the absolute magnitude of the resulting "standardised persistence" estimates changes somewhat, particularly in Portugal.[10] However, the cross-country ranking of countries presented in Figure 5 remains fairly

7 . The wage premium, coefficient *f* in equation (3) Box 4 when paternal education is high, is the increase in the child's earnings of having a father with tertiary education relative to a child whose father had upper-secondary education. The wage penalty, coefficient *f* in equation (3) Box 4 when paternal education is low, is the decrease in the child's earnings of having a father with less than upper-secondary education relative to a child whose father had upper-secondary education.

8 Several studies have documented the existence of non-linearities in persistence, that is the degree of persistence in wages across generations differ along the wage distribution (*e.g.* Jäntti *et al.* 2006; Bratberg *et al.* 2007; Corak and Heisz 1999; Grawe 2004). Such non-linearities are often explained by the fact that low-income parents face credit constraints in financing their children's education, and consequently such children's wages fall below that of non-constrained children with the same ability (*e.g.* Becker and Tomes, 1986; Becker 1989). There seems to be some suggestive evidence of the existence of non-linearities in wage persistence across a number of European countries (see Causa *et.al.* 2009 for details).

9 This "standardised wage persistence" is obtained by multiplying the estimated difference in the wage premium and penalty with the ratio of the standard deviation in father's education to the standard deviation in individual wages (see Causa *et.al.* 2009 for details).

10 Except for Portugal, in all countries the variation in paternal education is relatively larger than the variation in gross hourly wages implying that this adjustment "scales" down the estimated coefficient.

unchanged (the rank correlation between non-standardised and standardised persistence measure is 0.96). The remainder of the discussion in this study refers to the standardised measure of wage persistence.

21. It is difficult to compare this measure of persistence in wages over generations with existing estimates of the "intergenerational elasticity of income" reported in Figure 1 because the proxy used for parental background in this study is different from what is commonly used (some measure of father's wage or income). Even so, the findings in this study are qualitatively in line with existing evidence for pairs of fathers and sons.[11] The United Kingdom is estimated to have relatively low wage mobility, while some Nordic countries appear to be more mobile, as frequently found in previous empirical studies (*e.g.* d'Addio 2007; Corak, 2006). However, there are some differences. For instance, France appears to be much less mobile in terms of the "intergenerational income elasticity" than on the basis of the influence of fathers' education on sons' wages, perhaps reflecting that father's education is not a good proxy for parental income in this country.

Migration and intergenerational wage persistence

22. Differences in immigration patterns across European OECD countries could influence the patterns in wage persistence in Figures 4 and 5. The direction of the potential influence is difficult to assess *a priori* as it may depend on the nature of immigration. For example, many studies have argued that Canada's and Australia's relatively elevated estimated levels of intergenerational social mobility are driven by their high proportion of highly-skilled migrants (*e.g.* Abdurrahman, *et al.* 2008; d'Addio, 2007). However, in most European OECD countries covered in this study the estimates of persistence coefficients obtained controlling for individual migration status differ very little from those that omit this control and the differences are statistically insignificant.[12] Thus, migration does not appear to be an important driver of intergenerational wage persistence, and estimated cross-country differences in persistence are thereby not driven by cross-country differences in immigration patterns (see Causa *et.al.* 2009 for details).

The role of education as a driver of persistence

23. As a further step in the analysis of wage persistence, an attempt was made to separate the direct influence of a father's educational attainment on their offspring's wages from the indirect effect going through their offspring's own educational attainment (*i.e.* estimation of the relative magnitudes of coefficients *a* and *b* in equation (1), Box 4). The resulting estimates suggest that parental background mainly influences offspring's wages through their own educational attainment (*i.e.* by indirectly influencing offspring's productivity) except in a few countries (the United Kingdom, Spain, Italy, Netherlands, Luxembourg and Ireland) where direct linkages appear to be more important than the indirect ones through education. More specifically, in most countries fathers' educational attainment (estimates of coefficient *a* in equation (1), Box 4) is no longer important (*i.e.* significant) in determining their sons' wages once the latter's own educational attainment is taken into account. This result is even more pronounced in the case of women (Box 4 and Causa *et.al.* 2009 for details).

Cross-country patterns in intergenerational education mobility

24. Given that individuals' educational attainment appears to be a key driver of their wages in European OECD countries, it is important to understand to what extent skills acquired in formal education including secondary and post-secondary education are influenced by parental background. Moreover,

11 There are much less comparable estimates of intergenerational persistence in wages or incomes for daughters.

12 Migrants are identified as individuals born outside of EU25. It is not possible to distinguish between first and second generation migrants since there is no information of parents' migration status.

differences in secondary school educational achievement due to parental background may contribute to differences in post-secondary achievement which, in turn, can lead to persistence in wages. To this end, this section first analyses cross-country patterns of intergenerational education persistence in secondary education for teenagers, followed by persistence patterns in post-secondary education for adults.

Parental background influences students' achievement in secondary school…

25. The extent to which parental background, measured by a broad index of socioeconomic status of a student's family, influences students' cognitive performance at the level of secondary education differs substantially across OECD countries (Figure 6). Henceforth, when discussing persistence in secondary educational achievement across generations this refers to the estimated influence of this index on a student's performance on the PISA test score (see Causa and Chapuis, 2009 and Box 5 for details). As in the case of wage persistence, the estimates cannot distinguish between effects of parental background and genetically inheritable factors. France, New Zealand, Czech Republic, the United States and the United Kingdom are among the countries where persistence is highest according to this metric, while the countries in which persistence is relatively low are a heterogeneous group, including Iceland, Finland and Southern European countries, as well as Mexico and Turkey.[13]

[Figure 6: The influence of parental background on secondary students' achievement]

26. However, the variation within a country in the distribution of student's socioeconomic status (parental background) may matter for the overall impact of background on students' achievement (see PISA reports for details). The cross-country patterns of intergenerational educational persistence change considerably after taking country differences in the distribution of socioeconomic status into account (Figure 6).[14] More specifically, in countries like Mexico, Portugal, Luxembourg, Spain, and Turkey, where the dispersion in students' socio-economic backgrounds is wide, even a relatively mild influence of parental background on their achievement can lead to a large overall difference. After adjusting for the country-specific distribution of socioeconomic status, the United States, France and Belgium are countries where parental background has the greatest influence on students' achievement. The remainder of the discussion of persistence in secondary education takes these distributional differences across countries into account.

Box 5. The influence of parental background on students' achievement in secondary education

The empirical analysis of the influence of parental background on students' performance in secondary education is based on the 2006 PISA survey which collects a cross-country, comparable microeconomic dataset on student achievement (for details see OECD, 2007a; OECD 2005a, b). PISA assesses the skills of students approaching the end of compulsory education in 67 countries, including all OECD countries. PISA 2006 measures mathematical, scientific and reading literacy, as well as problem solving skills of students in each participating country. The target population is 15-year-old students in each country, regardless of the grade they currently achieve and independently of how many years of schooling are foreseen for 15-year olds by the national school systems. The main focus of the PISA 2006 study is on science literacy, with about 70% of the testing time devoted to this item. Given the very high correlation among science, mathematics, and reading scores, the analysis in this study focuses on those for science. OECD (2007a) points to the robustness of country-specific and cross-country empirical assessments to the use of either score.

13 On average, across OECD countries, for each improvement of one international standard deviation in the family's socio-economic background, the student performance on the OECD PISA science scale improves by 40 points, ranging from 25 (Mexico) to 54 (France), this corresponds to a performance increase of 5% and 10%, respectively (based on an OECD average PISA performance of 500 points).

14 In Figure 7, for each country, the influence of parental background (the so-called "socio-economic gradient") is presented along with a "corrected" influence of parental background, defined as the increase in student performance associated with the move from the first to the last quartile of the country-specific distribution of student background.

PISA scores have an OECD mean of 500 points and a standard deviation of 100 points.

Equity in student achievement is defined consistently with the concept of equality of opportunity (Roemer, 1998; 2004), according to which educational achievement should not reflect circumstances that are beyond a person's control, such as family socio-economic background. The empirical counterpart to this concept is to estimate the so-called "socio-economic gradient", which measures how strongly students' educational achievement measured by PISA test scores depends on the socio-economic background of the students' families. Specifically, the analysis uses the Index of Economic, Social, and Cultural Status (ESCS) provided by PISA as the measure of parental background.

The PISA ESCS index is intended to capture a range of aspects of a student's family and home background. It is explicitly created in a comparative perspective and with the goal of minimizing potential biases arising as a result of cross-country heterogeneity. The student scores on the index are factor scores derived from a Principal Component Analysis which are standardised to have an OECD mean of zero and a standard deviation of one. Thus, the size of the achievement difference between students with high and low values on the ESCS index provides a measure of how fair and inclusive each school system is: the smaller the difference, the more equal are educational opportunities.

In the baseline empirical model the student-level score is regressed upon his or her family socio-economic background:

$$Y_{isc} = \alpha_{1c} + \beta_{1c} \cdot F_{isc} + \varepsilon_{isc} \qquad (1)$$

where index *i* refers to individual, *s* to school, and *c* to country. Y_{isc} denotes the student's science test score, F_{isc} denotes parental background as measured by the ESCS index, and ε_{isc} an error term. Table 3 presents regression results of specification (1), with β referred to as the influence of parental background on student's achievement (i.e. the socio-economic gradient). Baseline estimations can be enriched to control for a number of individual factors (such as gender, migration, and language spoken at home) and school factors (location, resources, size, ownership and funding), allowing comparison of the "gross" and "net" impact of family background on student performance. The estimates take into account the hierarchical and sampling structure of the PISA dataset; specifically, they are based on a clustering-robust linear regression technique, which does not require that individual observations are independent within schools, but only that they are independent across schools (see Causa and Chapuis (2009) for details). In addition, probability weighting is used to reflect differing sampling probabilities across students within countries.

[Table 3. Estimates of the socio-economic gradient in OECD countries]

The influence of parental background on students' performance in secondary education can be divided into two parts, the "individual background" effect (F_{isc}) and the "school environment" effect ($\overline{F}_{sc}$), defined as the weighted average of students' socio-economic background weighed by students' individual weights in the school attended by individual *i* (which is computed excluding the student himself). The empirical approach for estimating the influence of individual background and school environment on students' test scores is an extension of equation (1):

$$Y_{isc} = \alpha_{1c} + \beta_{wc} \cdot F_{isc} + \beta_{bc} \cdot \overline{F}_{sc} + \varepsilon_{isc} \qquad (2)$$

Hence, while parameter β_{wc} refers to the individual's background effect, the parameter β_{bc} refers to the school's environment effect. As in equation (1), equation (2) can also be extended to control for student and school-level characteristics. Table 4 presents regression results of specification (2), which are discussed in the main body of the paper.

[Table 4. Estimates of the socio-economic gradient in OECD countries: school environment and individual background effects]

…and in many countries the school environment has a large influence on achievement

27. Using a similar approach as in PISA 2007 (OECD, 2007a), Figure 7 decomposes in two parts the overall influence of parental background on student achievement, an individual background effect ("within-school" effect) and a school environment effect ("between-school" effect). The individual background effect measures the relationship between student socio-economic background and student performance within a given school, while the school environment effect measures the relationship between the average socio-economic status of families of students in a given school and individual student

performance, controlling for his/her parental background (Box 5).[15] The school environment effect can be considered as a proxy for the contextual effect arising in the school, reflecting the extent to which students' achievement depends on the socio-economic composition of their peer group (see Causa and Chapuis, 2009 for a detailed discussion). Not all of the contextual effect is attributable to peer group effects; it may also reflect educational school resources and the way in which students are allocated within a district or region or to classes and programmes within schools (OECD, 2007a).

[Figure 7: Effects of individual background and school socio-economic environment on students' secondary achievement]

28. The numbers presented in Figure 7 represent, respectively*: i)* the increase in a student's PISA score obtained from moving the student from a school where the average socio-economic intake is relatively low to one where the average is relatively high; *ii)* the increase in a student's PISA score obtained from moving the student from a relatively low socio-economic status family to one that has a relatively high socio-economic status, while he/she stays in the same school. Comparisons incorporate the impact of the country-specific distribution of socio-economic status (both within and across schools) in the analysis.[16]

29. In all OECD countries, there is a clear advantage in attending a school whose students are, on average, from more advantaged socio-economic backgrounds, as indicated by the school environmental effect. In over half of the OECD countries, the school environmental effect is substantially higher than that of the individual background. However, cross-country differences are striking. Some countries show substantial inequalities associated with attending different schools: this is, for instance, the case in Germany or the Netherlands, where moving a student from a below-average school environment to an above-average school environment would raise test scores by, respectively 77 and 76 points, while the same move in Finland and Norway would raise test scores by 4 and 10 points, respectively.[17] These cross-country patterns are in line with existing evidence, in particular when comparing comprehensive school systems (*e.g.* Nordic countries) and non-comprehensive systems (*e.g.* Austria and Germany) (OECD 2007a; Fuchs and Wossmann, 2004; Entorf and Lauk, 2006).[18]

The influence of family background on students' achievement may be driven by bottom or top schools.

30. The sources of the influence of socioeconomic background on a student's achievement differ across countries. For example, in the United Kingdom, Poland and the Slovak Republic, persistence is concentrated at the top of the school distribution (in terms of average PISA scores of students attending the

15 More precisely, the school environment effect is defined as the difference in predicted PISA scores of two students with identical socio-economic backgrounds attending different schools (where the average background of students is separated by an amount equal to the inter quartile range of the country-specific school socio-economic distribution); the individual background effect is defined as the difference in predicted PISA scores of two students within a school (separated by the inter quartile range of the country-specific average within school socio-economic distribution).

16 This necessitates taking into account differences in the between and within schools distribution of students' socio-economic status. Hence, the comparison is made along two dimensions: both within countries and across countries. The approach differs from OECD (2007a) in that it is chosen to take cross-country differences in the distribution of socio-economic background into account, hence using country-specific distributions in the computations (Causa and Chapuis, 2009 for details).

17 This difference does not arise because of distributional differences, given the already high cross-country difference in unadjusted estimates of the within and between effects.

18 Comprehensive school systems refer to those that do not systemically separate students according to ability or proficiency level; students follow a general unified curriculum across secondary schools.

school), while the reverse is true in France, Greece and Ireland. Thus, in some countries, it is the top schools that make a difference and provide a relatively high pay-off to students, independent of their individual background, while in others it is the bottom schools that make a difference and provide a relatively high penalty to students attending them (Figure 8 and Causa and Chapuis , 2009).[19] In countries where socio-economic persistence is concentrated in bottom schools, this might suggest some scope for targeted policy interventions towards "weak" school environments. Moreover, to the extent that residential socio-economic segregation is reflected in school socio-economic segregation, housing markets and urban planning policies may also play a role in explaining differences in student achievement.

[Figure 8: The drivers of inequality in students' secondary educational achievement are often concentrated in top or bottom schools]

Intergenerational persistence in post-secondary education achievement

31. Parental background can also influence post-secondary educational achievement of their offspring, although cross-country comparable evidence of adult educational persistence across generations is rather sparse (Box 6). Here, this issue has been investigated empirically by estimating the percentage increase (decrease) in the probability of achieving a certain level of education given parents' education based on comparable data for European OECD countries (Box 4 and Causa *et.al.* 2009 for details). This gives an indication of the extent to which the offspring's education level reflects that of their parents and can be taken as a measure of intergenerational persistence in adult education.

Box 6. Post-secondary education mobility in selected OECD countries

For the adult population, the internationally comparable evidence of educational persistence across generations is sparser than that on income persistence and the evidence on educational persistence for teenagers. Intergenerational adult educational persistence can be estimated either based on the number of years of formal education or for qualification or literacy levels achieved.

Using data for a large number of countries, Chevalier *et al.* (2007) measure educational persistence based on adults' literacy level according to the International Adult Literacy Survey (IALS). They find persistence in education over generations across a wide set of developing and developed countries. The ranking of countries varies depending on the mobility measure employed. Overall, persistence is found to be high in Germany, Poland, Switzerland and the United Kingdom, while persistence appears to be lower in the Nordic countries, Belgium, and the United States.[1] Furthermore, the intergenerational link in education is estimated to be marginally weaker for women than for men. In general, educational mobility is also estimated to have increased over time.

A recent empirical study by Hertz *et al.* (2007) estimates educational mobility across generations using years of schooling for a number of countries. Again, there is persistence in adult education across generations for all countries (Figure 9). The correlation between parents' and their offspring's years of schooling is particularly high in Italy, Slovenia, Hungary, the United States, Switzerland and Ireland, while it is much lower in most Nordic countries (except Sweden) and the Netherlands. On average, the correlation between years of schooling for parents and their offspring is 0.39 for the countries surveyed, ranging from 0.54 in Italy to 0.30 in Denmark.

[Figure 9: Intergenerational persistence in years of schooling]

1. This ranking is based on the eigen value mobility measure reported in Hertz *et al*. (2007).

32. Across all European OECD countries covered by the analysis, there is a positive estimated probability premium of achieving tertiary education associated with coming from a higher-educated

19 Figure 9 shows the differences in the school's environmental effect for students attending schools at the top and those attending schools at the bottom deciles of the country-specific school distribution of socio-economic background. The estimated impact is calculated based on a regression where non-linearities in school socio-economic backgrounds are taken into account.

family, while there is a probability penalty associated with growing up in a less-educated family (Figure 10). For pairs of fathers and sons, the estimated premium is particularly large in Luxembourg and Italy, and also in Finland and Denmark, where the probability of achieving tertiary education is almost 30 percentage points higher for a son whose father had tertiary education, compared to a son whose father had upper-secondary education. The estimated penalty of coming from a low-educated family is sizeable in Ireland and Greece.[20] The ranking of the probability premium for pairs of fathers and daughters is relatively similar to that of sons. However, there are some differences. Daughters' probability premium is significantly lower than that of sons in Denmark, while it is much higher in the Netherlands, Ireland, Belgium and Austria. The probability penalty associated with growing up in a low-educated family for daughters is higher than that of men in several countries, particular in Portugal and Sweden.

[Figure 10: Probability premium and penalty of achieving tertiary education due to father's education levels]

Summary measure of persistence in tertiary education

33. In the same way as with intergenerational wage persistence, the persistence in tertiary education can be summarised by measuring the gap between the probability premium and penalty to achieve tertiary education, as reported above. A larger gap implies that a father's education more strongly influences individuals' education and, therefore, indicates stronger persistence in tertiary education across generations. According to this measure, persistence is relatively high in Luxembourg, Ireland and in most southern European countries, while it is relatively low in Austria and Denmark (Figure 11), in line with previous comparative studies (*e.g.* Hertz *et al.* 2007 and Box 6).

[Figure 11: Summary measure of persistence in tertiary education]

Intergenerational persistence in below upper-secondary education achievement

34. In all European OECD countries covered by the analysis there is also an estimated increase in the probability of achieving below upper-secondary education ("a probability penalty") for a son or daughter whose father had achieved below upper-secondary education compared to one whose father had achieved upper-secondary education (see Causa *et al.* 2009 for details). This probability penalty amount on average to 18 percentage points. Likewise, in most countries there is an estimated decrease in the probability ("a probability premium"), on average 10 percentage points, for an offspring to achieve below upper-secondary education if their father had achieved tertiary education compared to one whose father had achieved upper-secondary education. Persistence in below-upper secondary education is summarised by the difference in the probabilities to achieve below-upper secondary education depending on paternal education attainment, where a larger difference implies stronger persistence (Figure 12). According to this metric, persistence in below-upper secondary education is relatively strong in certain southern European countries, Ireland and Luxembourg, while it is lower in Austria, some Nordics, France and the United Kingdom.

[Figure 12: Summary measure of persistence in below-upper secondary education]

20 For pairs of fathers and daughters, there is also a sizeable probability premium and penalty in achieving tertiary education. The cross-country pattern in the estimated probability premium for 35-44 year old women is similar to that of men (see Causa *et.al.* 2009 for details).

Intergenerational social mobility in OECD countries: some concluding remarks

35. In this study intergenerational social mobility is measured by several different indicators since no single indicator provides a complete picture of social mobility. One pattern that emerges is that there is a group of countries that appears to be relatively immobile on most indicators (*e.g.* southern European countries and Luxembourg) and another group which tend to be relatively mobile (*e.g.* Nordics). However, these indicators do not necessarily provide the same picture of persistence across countries. For instance, the United Kingdom seems to be less mobile in terms of wage persistence (measured by the summary indicator of wage persistence) than in terms of adult education persistence (measured by the summary indicators of tertiary and below-upper secondary education persistence), while the reverse is the case in Ireland. In some other cases there appears to be a relatively large premium in achieving tertiary education associated with growing up in a well-educated family at the same time as the penalty of growing up in a less-advantaged family is fairly low (*e.g.* Denmark and Finland), whilst the reverse is true in some other countries (*e.g.* Sweden and Greece). Differences in cross-country rankings of persistence also emerge when comparing the measure of secondary education persistence (*i.e.* the influence of socio-economic background on students' PISA score) with adult education persistence measures. For example, in France persistence appears to be much stronger on the first than on the latter measures.[21]

Performance and equity in education

36. Even though family background influences offspring's secondary and post-secondary educational achievement in all OECD countries, although to a varying degree, some countries are characterised by having both relatively low persistence in education and relatively high average schooling performance (OECD 2007a). For instance, in Finland, Canada, Korea and Japan, students attending secondary education perform above OECD average on PISA scores, at the same time as the influence of socioeconomic background is below OECD average (Figure 13, panel A). Likewise, in some countries including Finland, Sweden and Denmark, persistence in tertiary education over generations is relatively low, whereas attainment levels are fairly high (Figure 13, panel B). This may partly reflect cross-country differences in public policies, suggesting that in some countries policies partly offset the effect of family background on educational outcomes.

[Figure 13: Performance and equity in education]

Low mobility in education could translate into inequalities in wages

37. Obstacles to social mobility may pile up to make the race towards upward wage mobility particularly hard for the offspring of disadvantaged families as inequalities at one stage of life translate into inequalities at later stages. Since learning is an ongoing process and skills acquired at one stage raise productivity and cognitive development in the next stage (*e.g.* Cuhna *et al.* 2006), inequalities that arise in secondary education are likely to translate into inequalities in higher education. In turn, these could translate into inequalities in wages via returns to education in the labour market or possibly through employability.

[21] Adult education persistence may be understated in France because the group of tertiary education fathers does not distinguish between having a father with a university degree and a father with a degree from a "Grand École". It is possible that the premium of having a father with a Grand École's degree is higher than the premium of having a university educated father.

Inequality, intergenerational social mobility and growth: the role of policies

Mobility and growth

38. Intergenerational social mobility may have positive effects on economic growth through the allocation of talents and abilities in the economy. Lacking such mobility, potential misallocation of talents and skills may lead to inefficiencies, with negative consequences for growth (*e.g.* Galor and Tsiddon, 1997; Murphy *et al.* 1991; and Box 7). Thus, public policies aimed at removing obstacles to intergenerational social mobility may improve the allocation of resources, thereby increasing growth. The reverse is also possible with faster economic growth generating more opportunities, which would enhance intergenerational social mobility if these opportunities disproportionately benefit the disadvantaged. For instance, in periods of major technological progress, the relative importance of own individual ability relative to parental background as regards the possibility to understand and take advantage of available economic opportunities may increase. This enhances mobility and generates a higher concentration of high-ability, better-educated individuals in technologically-advanced sectors, which in turn stimulates growth (Galor and Tsiddon, 1997).[22] Therefore, policies that stimulate economic growth may also promote intergenerational social mobility.

Box 7. A simple illustrative example of the potential effect of social mobility on growth

A simple numerical example can illustrate the potential impact of increasing social mobility on growth. Given the simplifying assumptions underlying the calculation, this example should be seen as purely speculative. Consider intergenerational education persistence and assume that the average relation between parents' and offspring's years of schooling in OECD countries (expressed in differences from average years of schooling among OECD countries) is:

Offspring's years of schooling = γ* Parents' years of schooling.

The average years of schooling among the OECD countries included in the example are 12.2 years, and assume that the average relationship between offsprings' and parents' years of schooling, γ, is 0.39 (Hertz *et al*. 2007). Now, consider a country in which years of schooling fall short of the OECD average, at the same time as persistence in years of schooling is above OECD average (Figure 14). For example, consider Italy with average years of schooling of 10.1 years and average persistence in years of schooling of 0.54. In this country 1.16 (*i.e.* 0.54*(10.1-12.2)) years of the shortfall in years of schooling could potentially be passed on to offspring from parents. Reducing persistence in schooling to the OECD average of 0.39 would reduce the shortfall of schooling that could be passed on to the next generation to 0.85 (0.39*(10.1-12.2)). Thus, reducing the intergenerational persistence in schooling to the OECD average would reduce from 1.16 to 0.85 the shortfall in years of schooling (relative to the OECD average) that could potentially be passed on from one generation to another.

[Figure 14: Intergenerational persistence in years of schooling and years of schooling]

The effect on long-run GDP per capita of a decrease in educational persistence, resulting in an increase in average years of schooling, depends on the influence of additional years of schooling on GDP as well as on how much of the original shortfall in schooling is explained by the offspring being constrained by their background. Recent OECD estimates suggest that one additional year of schooling would increase the long-run level of GDP per capita by between 4 to 7% (OECD, 2003). For instance, to the extent that the short-fall in schooling is entirely due to the fact that in Italy the offsprings are constrained by their background, the potential increase in years of schooling from reducing persistence would translate into a 1.3 to 2.2% (*i.e.* 0.31*4 and 0.31*7) increase in long-run GDP per capita (see Table 5 below). However, if the shortfall in schooling is only partly explained by parental background, then the range of GDP per capita gains from decreasing persistence would be smaller. The numbers obtained in this example need to be interpreted with caution as a number of caveats apply to this exercise. For instance, it is likely that the misallocation of human resources is not fully captured by the link between parents and their offspring education, as well as persistence

22 But once existing technologies become more accessible the importance of ability may decline and mobility may fall back to previous levels.

in education may not be measured properly by the relation between parents and their offspring years of schooling.

[Table 5: The effect of increased mobility on long-run growth]

Mobility and inequality

39. An important channel through which public policies could potentially influence intergenerational social mobility is by affecting intra-generational inequality. The distribution of cross-sectional household income is strongly influenced by the distribution of wages (*e.g*. Galbraith and Kum, 2005; Gottshalk and Danziger, 2005), which in turn reflects differences in returns to education. In addition to returns to education, differences in wage distribution across countries reflect labour supply and demand factors as well as the institutional environment (*e.g.* Blau and Kahn, 1996; 2003; Acemoglu 2003; OECD 2002). For instance, across OECD countries, wage dispersion is lower in countries where institutions tend to compress the distribution of wages (*e.g.* the Nordic countries). However, these wage compressing institutions also tend to reduce employment among certain groups (*e.g.* Bassanini and Duval, 2006) and thus reduce the overall share of wage-earners in the economy. In turn, this would increase cross-sectional income inequality across the entire population.

40. However, the relationship between cross-country income and/or wage inequality and intergenerational income persistence is not straightforward as various channels are at work, sometimes in opposite directions. On the one hand, countries with a wide distribution of income are also likely to be those where the returns to education are relatively high. As discussed above, if parental background or income affects access to and/or investment in education through credit or other constraints, then the ability to take advantage of the high returns from education is limited to the offspring of relatively advantaged parents (Corak, 2006; Solon 2004, d'Addio, 2007). Therefore, when inequalities between parents increase, intergenerational mobility falls because it is easier for advantaged parents to buy their children educational advantages that disadvantaged parents cannot afford (Burtless and Jencks 2003).[23] On the other hand, inequality could increase intergenerational mobility by enhancing incentives to undertake effort (*e.g*. Lazear and Rosen, 1981), *e.g.* by working longer hours or by strengthening incentives to undertake education, which could result in more investment in education if financial markets are sufficiently developed.[24] With returns to education likely to be higher in more unequal societies and with incentives to acquire additional education stronger in countries where the "pay-off" from doing so is relatively larger, social mobility could be higher in countries where income or wage dispersion is higher.

Positive association between intergenerational income persistence and inequality

41. While theory and evidence are mixed, some studies suggest that higher cross-sectional inequality tends to be associated with lower mobility (Björklund and Jäntti, 1997; Solon, 2004; Andrews and Leigh 2007; Corak 2006; d'Addio 2007). Indeed, the association between cross-sectional inequality (measured by the Gini coefficient of household disposable income) and the persistence in wages across generations measured by the estimated wage gap between individuals coming from different family backgrounds is

23 However, this effect will be mitigated to the extent that children from less advantaged backgrounds disproportionately benefit from public spending on education (Solon, 2004).

24 In addition, higher wage differentials can also be productivity enhancing. If wages are based on relative productivity, then workers with higher productivity (effort) will be rewarded with higher wages. This will increase equilibrium effort and lead to a positive relationship between wage dispersion and productivity. However, individual effort is reduced if wage differences are regarded as unfair (Akerlof and Yellen, 1990).

positive in European OECD countries covered by the analysis (Figure 15). OECD estimates also show that a higher degree of inequality is associated with a greater influence of individual socio-economic background on students' cognitive achievement in secondary education in a larger set of OECD countries (ECO/CPE/WP1(2009)4/ANN2).

[Figure 15: Correlation between inequality and intergenerational wage persistence]

42. Similarly, there is a positive association across European OECD countries between intergenerational persistence in wages and poverty rates (based on a measure of household disposable income), although weaker than the association between persistence and inequality (see Causa *et al.* 2009). Again, this link is also recorded for OECD countries at the level of teenagers' cognitive skills. More specifically, higher levels of child poverty (measured after taxes and transfers) and a greater lack of basic resources are associated with a stronger influence of parents' socio-economic background on their offspring's cognitive achievement.

Wage-setting institutions and intergenerational income persistence

43. As discussed above, cross-country differences in wage-setting institutions are likely to be reflected in cross-country differences in wage inequality, and inequality in turn appears to be positively associated with persistence in wages and education across generations. It is possible, therefore, that differences in these institutions could also be reflected in wage persistence across countries. Indeed, multivariate regression results suggest that across the European OECD countries covered by the analysis, countries characterised by both higher union density and coverage of collective agreements display a lower degree of intergenerational persistence in wages (Box 8 and Causa *et al.* 2009). One possible interpretation of this finding is that wage-setting systems based on high unionisation, high coverage of collective agreements, and highly co-ordinated collective bargaining all seem to reduce wage dispersion (*i.e.* inequality), and mainly at the bottom of the wage scale (*e.g.* Edin and Toppel, 1997; Calmfors, 2004; Checchi and Gracia-Peñalosa, 2008).[25] However, lower wage dispersion at the bottom may also reduce low-skilled and/or low-wage employment, and in this way increase overall income inequality. For example, recent OECD work found that high unionisation tends to reduce older workers' employment consistent with the hypothesis that strong unions may compress the wage structure and drive a wedge between employers' labour cost and the marginal productivity of workers, thereby pricing potentially less productive workers out of the job market (Bassanini and Duval, 2006; OECD 2006c).

Mobility and policies

44. Insofar as faster economic growth enhances social mobility, policies that have a positive effect on the drivers of growth (*e.g.* tax or labour market reforms) could also increase social mobility across generations. Moreover, the direct effect of these policies on growth is likely to materialise quicker than any indirect effect through social mobility since mobility largely influences growth by improving the allocation of human resources over generations, which takes a long time to materialize. Thus, it is likely that any direct effect of a policy on drivers of growth outweighs the indirect effect via social mobility, at least in the short- to medium-term.

45. At the same time, some of the policies that are thought to positively affect social mobility by reducing inequality may also indirectly have adverse effects on some of the drivers of growth (*i.e.* labour utilisation or productivity) and, conversely, some policies that are thought to enhance the drivers of growth may have adverse effects on social mobility. In this situation, a prudent policy approach could be to

25 However, it is possible that this finding partly reflects that countries with more compressed wage structure *per se* have relatively lower dispersion in wages that could potentially be explained by parental education.

implement policies that remove obstacles to intergenerational social mobility without any adverse side effects on economic growth. Furthermore, it may be desirable to accompany growth-oriented policies with measures to lower their potentially negative effect on social mobility (especially through inequality), both because it may be desirable in itself and because it may reduce potentially harmful side effects on growth.

46. Ultimately, both the effects on growth of policies encouraging social mobility and those on mobility of policies encouraging growth are an empirical issue. While assessing the former effects is beyond the scope of this study, the remainder of this section explores the role played by a range of public policies *vis-à-vis* social mobility especially via the inequality channel. The empirical strategy for analysing such role of policies in a cross-country context is described in Box 8 (with more details to be found in Causa and Chapuis, 2009 and Causa *et al.* 2009).

Box 8. The influence of policies on intergenerational social mobility

This box provides a simplified and stylised description of the common empirical approach underlying the cross-country analyses of the role of policies for intergenerational social mobility, which are based on PISA data for teenagers' cognitive skills and EU-SILC data for wages. The approach is based on two cross-country variants of the country-level analyses described in Boxes 3 and 4 (for details see Causa and Chapuis (2009) and Causa *et al.* 2009):

$$O_{ic} = \alpha_1 + \lambda \cdot F_{ic} + \gamma_c \cdot X_{ic} + \delta \cdot P_c \cdot F_{ic} + \phi \cdot P_{c\cdot} + \psi \cdot Z_{c\cdot} + \varepsilon_{ic} \qquad (2a)$$

$$O_{ic} = \alpha_1 + \lambda \cdot F_{ic} + \gamma_c \cdot X_{ic} + \delta \cdot P_c \cdot F_{ic} + \theta \cdot C_{c\cdot} + \varepsilon_{ic} \qquad (2b)$$

where O_{ic} denotes outcomes (gross hourly wages and test score in PISA) of individual *i* in country *c*, F_{ic} denotes parental/family background (father's education or family socio-economic status), X_{ic} denotes individual characteristics, Z_c denotes country-level variable(s), P_c denotes country-level policy variables and C_c denotes country fixed effects. In these equations, individual characteristics display country-specific coefficients. Equations (2a) and (2b) describe country-specific models, in which only the impact of the variables F_{ic} is restricted to be equal across countries.

Equation (2a) allows estimating the direct impact of policies on individual's outcome, while equation (2b) includes country fixed effects and thus cannot identify the direct influence of a policy on the dependent variable as policies do not vary within a country or across cohorts. In order to assess the impact of policies on persistence the analysis focuses on the signs and the magnitude of the interaction coefficient δ. Indeed, the family background effect varies across policy settings as follows:

$$\frac{\partial O_{ic}}{\partial F_{ic}} = \hat{\lambda} + \hat{\delta} \cdot P_c \qquad (2c)$$

where hats indicate estimated coefficients. A positive δ means that the influence of family background on outcomes increases ($\lambda + \delta > \lambda$) and a negative δ means that it decreases ($\lambda + \delta < \lambda$) with the policy indicator P_c.

Equation (2c) can also be used to calculate the family background effect associated with different levels of the policy indicator across OECD countries (*e.g.* minimum, mean, or maximum), providing a tentative way to quantify the relative impact of policies on equality of opportunity.

Following this approach, Figures 16, 17 and 18 provide illustrative examples of the quantitative impact of policies on persistence in secondary education and wages, by simulating family background effects under different policy settings corresponding to the observed variation of policies across the countries covered by estimations. The way to interpret these figures is as follows. Figure 16 shows that increasing enrolment in childcare from the lowest level in the OECD (2%) to the highest (62%) would bring down the influence of the school environment effect on student performance from 61 to 13 test points in the PISA score. Similarly, Figure 18 shows that raising the average unemployment benefits from the lowest to the highest level in the OECD would reduce the wage gap associated with different family backgrounds from 15 to 0.7 percentage points.

[Figure 16: Effect of the school socio-economic environment on secondary education achievement under different policy settings]

[Figure 17: Effect of individual parental background on secondary education achievement under different policy settings]

[Figure 18: Effect of father's educational attainment on his son's wage under different policy settings]

These illustrative calculations have to be taken with great caution, given the empirical limitations associated with the underlying estimations. In particular, the finding of a significant correlation between the distribution of policies and the distribution of family background effects should not be interpreted in a causal way. Moreover, it cannot be excluded that the impact of a particular policy might indeed capture the impact of another, correlated and omitted policy.[1]

1. It is not possible to introduce several policies at the same time because multicollinearity makes it difficult to identify their respective impact.

Early intervention policies

47. There is a growing recognition that access to early childhood education and care could provide young children, particularly from low-income and second-language groups, with a good start in life (Carneiro and Heckman, 2003; Machin 2006; d'Addio, 2007; OECD, 2006a, OECD, 2007c).[26] Recognising this, the provision of cost-effective and quality childhood education and care is on the government's agenda in many countries. The introduction of active policies such as "Sure Start" in the United Kingdom and "Head Start" in the United States, which are designed to level the playing field at or near school entry age for children from disadvantaged backgrounds, are examples of such programmes. Existing evidence concerning the impact of programmes targeted to pre-school children from disadvantaged backgrounds suggest that they have been successful in alleviating some of the initial gaps of children born in adverse family environments (*e.g.* Heckman, 2005; Currie and Blau 2005; Brooks-Gunn 2003; Sylva *et al.* 2004; OECD, 2004).[27] Cross-country regression results obtained in the context of this study suggest that enrolment in early childcare and education (day-care and pre-school) as well as spending on childcare and early education are inversely related to the influence of family background on cognitive skills of teenagers (Figure 16 in Box 8 and Causa and Chapuis, 2009).

Educational policies and intergenerational social mobility

Education policies and school practices

48. Several empirical studies have documented a negative influence of early tracking policies on equality in educational achievement.[28] Systems that start grouping students early in their educational curricula tend to be associated with larger socioeconomic inequalities, with no associated gains in average performance (OECD, 2007a). Results from cross-country regressions confirm these findings, suggesting that the influence of parental background on their offspring's performance at secondary school tends to be lower in countries where tracking takes place at a later stage and/or where ability grouping within schools occurs to a lesser extent (so called "comprehensive systems"), as compared to countries in which tracking and ability grouping occurs earlier (so called "non-comprehensive systems). For example, regression estimates would suggest that moving from a system that separates students into different schools at age ten (as is done in Germany and Austria) to a system that separates students at age sixteen (as is done in half of OECD countries) would reduce the effect of the school's socio-economic environment from 77 to 27 PISA score-points (Figure 16 in Box 8).[29]

49. Vocational education varies substantially across OECD countries in its design and implementation, as well as in its degree of success in equipping individuals with the necessary skills needed on the labour market (*e.g.* Machin and Vignoles, 2005; Büchel, 2002). For instance, in many

26 Studies in child development emphasise that different stages of a child's life are important for the formation of different abilities and skills, and when these opportunities are missed, remediation is costly, with full remediation being often prohibitively so (Shonkoff and Phillips, 2000).

27 The success of these interventions is not attributable to IQ improvements of children, but rather to their success in boosting non-cognitive skills (Heckman, 2005).

28 Both cross-country and country-specific studies have highlighted the negative impact of ability tracking on mobility (for cross-country evidence, see OECD, 2004; 2007a; Schütz *et al.* 2005; Hanushek and Wossmann, 2005; Sutherland and Price, 2007; Duru-Bellat and Suchaut, 2005; Amermuller, 2005; for country-specific evidence, see *e.g.* Bauer and Riphahn, 2006; Pekkarinen *et al.* 2006; Holmlund, 2006; and Bratberg *et al.* 2005)

29 A similar result is found for the number of school programmes available to 15-year olds, which is another measure of early differentiation in secondary education (see Causa and Chapuis, 2009 for details).

OECD countries upper-secondary students can enrol in vocational programmes, while some countries delay vocational education until after upper-secondary education (*e.g.* Canada, the United States).[30] Moreover, in some countries vocational training takes place mainly in schools and colleges (*e.g.* Nordic and Eastern European countries), while in other countries such training takes place mainly on the workplace through apprenticeships (*e.g.* Germany and Austria) or through a combination between schools and workplaces. These differences need to be kept in mind when evoking the concern that vocational education within secondary education ends up grouping "weak/disadvantaged" students into programmes which limit their future learning possibilities in a way similar to early tracking. Cross-country estimates suggest that there is a positive association between enrolment in vocational education and the influence of parental background on their offspring's secondary achievement (as measured by PISA scores). Vocational education at secondary education level appears to exacerbate achievement differences associated with the school socio-economic environment without increasing overall performance.

Education policies and resources

50. Schooling resources and inputs have largely dominated the policy discussion throughout the OECD and, given the importance attached to the link between human capital and growth, educational spending has strongly increased since the mid-1990s. However, research on the relationship between educational spending and student performance is less encouraging, most reviews tending to reach the same conclusion: some measurable school inputs do sometimes matter for performance but the magnitude of their effects is estimated to be relatively small (Hanushek, 2003 for a review; Schütz *et al.* 2005; OECD, 2007a). Cross-country regression estimates performed in the context of this study also suggest that increasing educational resources – either through raising spending or through reducing class size – might not be the most effective tool for promoting equity in secondary education (see Causa and Chapuis, 2009).[31] By contrast, the ability to prioritise and allocate resources efficiently, measured by recently constructed OECD indicators capturing the "degree of decentralisation" and "degree of mechanisms matching resources to specific needs", seems to be negatively associated with the influence of parental background on their offspring's achievement in secondary education.[32] This effect mainly derives from a weaker association between the school socio-economic environment and individual student performance.

51. The importance of teacher quality for determining student outcomes is rather well-established (*e.g.* Hanushek 2005 for an overview). New estimates undertaken for this study show a negative association between the proportion of qualified teachers and the influence of parental background on their offspring's achievement at secondary school. While raising teachers' quality/skills might, therefore, help to promote educational equity, little is known on how to translate this into effective policy. One frequent suggestion to improve the quality of teachers is to raise their salary levels or to increase salaries in the most disadvantaged schools or areas (or to introduce some type of performance -based pay). Indeed, cross-country estimates suggest that the influence of family background on students' achievement at secondary

30 On average in OECD around 46% of upper-secondary students are enrolled in pre-vocational or vocational programmes (OECD, 2009)

31 This summary presentation of the results does not distinguish between heterogeneous tools (spending increases, class size reductions) that are tested in the cross-country regressions. In particular, while spending is clearly a poor driver of educational equity, cross-country analysis shows that reductions in class size mitigate inequalities associated with schools' socio-economic differences (*i.e.* they reduce the school environment effect). However, the educational literature emphasises the difficulty of properly identifying the channels through which changes in class size impact upon schools' contextual effects and the corresponding students' outcomes, casting doubts on the effectiveness of reducing class sizes for equity purposes.

32 For details on the definition and computation of these institutional indicators, see Sutherland and Price (2007).

school is lower in countries where teachers' wage profiles are steeper over their career. However, it should be recognised that such wage profiles may not capture performance-based pay systems, but rather constitute a proxy for cross-country differences in "seniority wage profiles".

Loan systems and persistence in post-secondary education

52. Evidence of credit constraints in undertaking tertiary education is rather limited and mostly concerns the United States. A few studies tend to suggest that credit constraints may not be the greatest obstacle to accessing higher education for disadvantaged students (Carneiro and Heckman 2003; Dreaden *et al.* 2004; Freynette, 2007; Wossman, 2008); rather it is the lack of adequate qualifications to be accepted into higher education, which possibly points to the need for policies to intervene earlier (see above). By contrast, a recent study found evidence of the presence of credit constraints in post-secondary education in some European countries (Vandenberghe, 2007) and recent OECD work also found that lower financial constraints are associated with higher tertiary graduation rates (Oliveira *et al.* 2007). If financial constraints are present they are likely to be more important for able offspring from low-income backgrounds. In fact, cross-country empirical evidence tends to show that in a few European OECD countries (*e.g.* Belgium, France, Italy, Luxembourg, the Netherlands and the United Kingdom), financial constraints may hold back highly able individuals from disadvantaged backgrounds (see Causa *et al.* 2009 for details).[33]

53. The design of tertiary educational loan systems and student support differs across OECD countries. Some countries apply universal/individual-based systems which consider higher education students as financially independent from their parents, whereas others use systems in which students are considered as being members of their families for the purpose of both financing and taxation. In general, in countries using other types of funding systems than the universal/individual systems the penalty of having a lower-educated father for achieving tertiary education is larger, compared to the penalty in countries having a universal funding system (Figure 19). There is suggestive evidence that universal government-supported loan systems can reduce liquidity constraints, thereby enhancing equality of access while maintaining incentives for swift and successful study completion (Oliveira *et al.* 2007).

[Figure 19: Funding system and access to tertiary education]

Redistributive and income support policies

54. Income transfer policies redistribute income or act as an insurance against unexpected income loss and could mitigate the impact of family background on antecedent offspring's education and wages by reducing current inequalities and poverty. For instance, redistributive policies can alleviate financial constraints on disadvantaged families and allow them to invest in their children's human capital. Furthermore, social policies and redistributive taxes may narrow the gap between current incomes of parents, so that the incomes of their offspring could regress to the mean more quickly (Corak, 2006).[34] In this way, well-targeted redistributive policies could not only reduce current but also future inequalities.

33 This finding is obtained by assessing the influence of parental background on their children's earnings at different quantiles of childrens' earnings distribution (so-called quantile regressions). If financial constraints are present, the influence of parental background should be stronger in the upper quartile, since it is the more competent children from low-income families that are most likely to be financially constrained (Graewe, 2004).

34 This relies on two assumptions. First, an increase in income for parents has the same influence on their offspring regardless of its source, and second the relationship between parents' and offspring's wages is linear and stable across the wage distribution.

Taxation

55. One common measure of the redistributive nature of the tax system is the progressivity in the personal income tax schedule. Progressivity differs significantly across OECD countries and has also varied over time (Johansson *et al.* 2007), which may reflect differences in social preferences, with strong progressivity in countries where emphasis is placed on a more even distribution of post-tax income and consumption. Cross-country estimates suggest that higher tax progressivity correlates across countries with a lower influence of parental background on their offspring's cognitive achievement in secondary education, as well as on their wages (Figures 17 and 18 in Box 8 Causa and Chapuis, 2009 and Causa *et al.* 2009). To capture the possible effect of taxation on parents' ability to invest in their children's education, progressivity is measured at the time when the individual was a teenager. Thus, one interpretation of the positive link with students' performance and wages could be that redistributive policies allow less-advantaged parents to provide their children with a better environment, as well as with more time and resources for their education and upbringing (see below). This may facilitate learning at later stages in life, which could reduce inequality of opportunity in both higher education and wages. It is also possible that this finding reflects targeted tax cuts or tax credits (*e.g.* in work benefits) to low-income households which, in turn, lowers the after-tax wage differential between low-income and higher-income households (*i.e.* reduce inequality).

Unemployment benefits

56. All OECD countries use unemployment benefits to support income of unemployed individuals, although to a varying degree. Short-term net unemployment benefits are found to be negatively associated with the influence of parental background on their offspring's achievement in secondary education (Figure 17 in Box 8 and Causa and Chapuis, 2009). Consistent with this, the average unemployment benefit replacement ratio is also found to be negatively associated with intergenerational wage persistence across the European OECD countries covered by the analysis (Figure 18 in Box 8 and Causa *et al.* 2009). As above, unemployment benefits are measured at the time when the individual was a teenager. The policy implications of these findings are not clear, because existing empirical evidence also suggests that the presence of transfer income among parents is associated with lower wage prospects for their offspring (Corak, 2006). Moreover, some studies have found a considerable degree of intergenerational persistence in reliance on welfare, which could imply sustained cycles of welfare dependency (Page, 2004).[35] Therefore, income-support programmes are more likely to remove obstacles to intergenerational mobility if they are designed to encourage labour market participation and self-sufficiency across generations, while at the same time providing adequate income support during job search.

Labour and product market regulation

57. Differences in labour and product market regulations across OECD countries may contribute to differences in inequality, and in turn in intergenerational income persistence. Labour, and especially product market reforms, have been widely implemented in OECD countries over the past decades, partly with the aim of raising economic performance (OECD, 2007b). It is, therefore, important to examine their potential association with intergenerational social mobility.

35 A possible explanation of this phenomenon is that growing up in families who depend on welfare support reduces the stigma perceived by the offspring in getting his/her income from this source. Another possibility is that an individual living in a family receiving welfare support acquires information about the programme and its rules, thereby making it easier for her/him to collect it (Corak, 2006).

Easing employment protection legislation

58. Multivariate cross-country estimates suggest that there is a positive association between employment protection for regular contracts and intergenerational wage persistence in European OECD countries (Figure 18 in Box 8 and Causa *et.al* (2009)). The explanation of this finding is not straightforward. One hypothesis is that stricter employment protection on regular contracts is used by protected workers (so called "insiders") to claim higher wages (Lindbeck and Snower, 1998; Garibaldi and Violante, 2005), at the expense of the unemployed and or precarious workers (so called "outsiders"). To the extent that individuals from advantaged backgrounds are more likely to be among the group of "insiders", while individuals from less advantaged backgrounds are more likely to be among "outsiders", strict protection may increase the relative wage differential between the two groups. In turn, an increase in wage inequality may translate into higher intergenerational wage persistence.

Easing product market regulation

59. By contrast, estimates suggest that there is a negative association between regulation in product markets and persistence in wages across generations (Figure 18 in Box 8 and Causa *et.al* (2009)). Again the interpretation of this finding is not easy. One conjecture is that "rents" are larger in more regulated industries or economies and that some of these rents are captured by workers, including workers from less advantaged backgrounds. Domestic deregulation could then reduce the "rents" appropriated by workers relatively more in areas of the economy employing a large share of low-skilled workers (*e.g.* service and non-exporting sectors) among whom the offspring of less advantaged families may be overrepresented.[36] Again, this may translate into lower social mobility by increasing wage inequality.

Housing policy

60. In some OECD countries housing market outcomes encourage urban fragmentation along socio-economic lines, with a concentration of disadvantaged households in particular housing estates (OECD, 1998). Residential socio-economic segregation is often matched by schooling socio-economic segregation, primarily because a large share of students tends to go to schools in their own neighbourhood either for convenience or for regulatory reasons. As discussed above, the schools' environmental effect is sizeable in a number of OECD countries. Moreover, it tends to be larger in cities (see Causa and Chapuis (2009)). The presence of residential segregation and large school environmental effects is associated with significant socio-economic inequalities, presumably leading to higher education and wage persistence across generations.[37] Thus, the design of housing and urban planning policies may play a role in removing obstacles to intergenerational social mobility. For example, in countries where there are large contrasts between private and social rental housing (so called "dualist rental system"), and the latter is attached with a certain degree of stigma, low-income households tend to cluster geographically (*e.g.* the United Kingdom, Belgium, Japan, Australia and New Zealand), while in countries where private and social rental housing are integrated in one market (so called "unitary rental system"), residential socio-economic segregation tends to be less pronounced (*e.g.* Sweden, Denmark, Austria; OECD, 2006b). Thus, policies aimed at increasing the social mix in neighbourhoods (for instance, by improving housing quality in deprived areas in order to attract middle-class families, OECD, 2006b) could be instrumental for

36 By increasing exposure to international competition, lower product market regulation may also increase the relative wages of more skilled workers that are employed in exporting industries (Feenstra, 2000; Feenstra and Hansen, 1999).

37 Schools' environmental effects, and the so-called "neighborhood effects", are interrelated social phenomena. In particular, schools' environmental effects may be one of the channels through which neighborhood composition impacts individuals' behavior and outcomes (*e.g.* Goux and Maurin, 2007).

improving social mobility, especially in countries where the influence of the school socio-economic environment on student performance is relatively large.

61. Consistent with this, cross-country regression results suggest that there could be potential equity and efficiency gains from increasing social mix in schools for a number of OECD countries (see Causa and Chapuis (2009) for details). According to these estimates, in countries suffering from high levels of school socio-economic differences, low-skilled or disadvantaged students would benefit more from interacting with more able or socio-economically advantaged students, than the latter would lose from interacting with less able students. Moreover, estimates also show that in most OECD countries there is no adverse influence and in some cases also favourable effects of the social mix on average student performance. These results are only suggestive, but they would indicate that there is no trade-off between social mix and overall performance. Hence, implementing measures aimed at reducing school socio-economic segregation through educational policies,[38] but also through housing policies, could help promote social mobility without hampering and perhaps even improve educational efficiency.

38 School policies, such as school choice, can also be used as a tool to reduce residential and school segregation (see Causa and Chapuis, 2009). Cross-country research on this topic is scarce, mostly due to measurement issues. School competition may induce cream skimming, increase segregation and lead to adverse effects on disadvantaged students. However, specific experiences suggest that properly designed and equitable voucher systems can yield positive outcomes on educational inequalities (*e.g.* West and Peterson, 2006) study on voucher systems in Florida). Hoxby (2003) also suggests similar equity-enhancing effects of voucher and charter school programmes.

GLOSSARY

- **Contextual effects**: contextual effects arise when the probability that an individual behaves in some way depends on the distribution of exogenous background characteristics in the group: in the present work, student achievement depends on the socioeconomic composition of the reference group, measured at the school level.

- **Equality of opportunity**: the concept of equality of opportunity was originally introduced by Roemer (1998) and states that individual achievement should not reflect circumstances that are beyond an individual's control, such as family background.

- **Individual background effect, or within-school effect**: the individual background or within-school effect measures the relationship between student performance, as measured by PISA 2006 science scores; student socioeconomic background, as measured by the student-level PISA ESCS index; controlling for school socioeconomic background, as measured by the average ESCS level across students within the school.

  – The individual background effect can be used to predict country-specific differences in student performance associated with the difference between the highest and the lowest quartiles of the country-specific within-school average distribution of the PISA ESCS index, calculated at the student level.

- **(Intergenerational) persistence**: (Intergenerational) persistence is synonymous to (intergenerational) immobility and refers to the positive association between outcomes of parents and their offspring.

- **Intergenerational income elasticity:** refers to the point estimate of the relationship between offsprings' and parents' incomes; it measures the extent to which the offspring's income levels reflect their parents' income levels. When this elasticity is equal to zero, there is complete mobility in the sense that parents' and offsprings' incomes are unrelated. By contrast, a value of one represents a situation with complete immobility, where the income condition of parents is fully mirrored in that of their offspring. The income concept varies between different studies, most often being some measure of current wages/earnings.

- **Programme for International Student Assessment (PISA) 2006 science score**: This study uses cross-country comparable microeconomic data on student achievement, collected consistently across and within OECD countries through the PISA. PISA aims to assess the skills of students approaching the end of compulsory education. The main focus of the PISA 2006 study is on science literacy, with about 70% of the testing time devoted to this item. Given the very high correlation among science, mathematics, and reading scores, the following analysis focuses on science scores. *The performance in science is mapped on a scale with an international mean of 500 and a standard deviation of 100 test-score points across OECD countries* (aggregate OECD mean, using appropriate students' weights).

- **PISA index of economic, social, and cultural status (ESCS):** the PISA ESCS index is intended to capture a range of aspects of a student's family and home background. It is explicitly created by PISA experts in a comparative perspective and, hence, with the goal of minimising potential biases arising as a result of cross-country heterogeneity. It is derived from the following variables: *i)* the international socioeconomic index of occupational status of the father or mother, whichever is higher; *ii)* the level of education of the father or mother, whichever is higher, converted into years of schooling; *iii)* the index of home possessions obtained by asking students whether they had at their home: a desk at which to study, a room of their own, a quiet place to study, an educational software, a link to the Internet, their own calculator, classic literature, books of poetry, works of art (*e.g.* paintings), books to help with their school work, a dictionary, a dishwasher, a DVD player or VCR, three other country-specific items, as well as the number of cellular phones, televisions, computers, cars and books at home. *The student scores on the index are factor scores derived from a Principal Component Analysis which are standardised to have an OECD mean of zero and a standard deviation of one* (aggregate OECD mean, using appropriate students' weights).

- **Peer effects**: peer effects arise when the probability that an individual behaves in some way is increasing with the presence of this behaviour in the group: in the present work, student achievement depends positively on the average achievement in the reference group, measured at the school level. Peer effects are also referred to as endogenous effects.

- **Probability premium of achieving tertiary education:** The probability premium is the percentage increase in the probability that an offspring will achieve tertiary education given that his father had tertiary education relative to an offspring whose father had upper-secondary education. A larger premium indicates that a father's education more strongly influences his offspring's education and can be interpreted as stronger persistence in education.

- **Probability penalty of achieving tertiary education:** The probability penalty is the percentage decrease in the probability that an offspring will achieve tertiary education given that his father had below upper-secondary education relative to an offspring whose father had upper-secondary education. A larger penalty indicates that a father's education more strongly influences his offspring's education and can be interpreted as stronger persistence in education.

- **School environment effect, or between-school effect**: the school environment effect or between-school effect measures the relationship between student performance, as measured by PISA 2006 science scores, and school socioeconomic background, as measured by the average ESCS index, across students within the school, controlling for student socioeconomic background as measured by the student-level PISA ESCS index.

  – The school environment effect can be used to predict country-specific differences in student performance associated with the difference between the highest and the lowest quartiles of the country-specific school-level average distribution of the PISA ESCS, calculated at the student-level.

- **Socio-economic gradient, or the extent to which parental background influences students' achievement at secondary school**: the (socio-economic) gradient measures the relationship between student performance, as measured by PISA 2006 science scores, and student socioeconomic background, as measured by the PISA ESCS index. Discussion of persistence in secondary education across generations refers to this gradient.

- The (socio-economic) gradient is called "(socio-economic) gradient taking cross-country distribution differences into account" when the estimated gradient is used to predict country-specific differences in student performance associated with the difference between the highest and the lowest quartiles of the country-specific distribution of the PISA ESCS index.

- The (socio-economic) gradient can be called "gross (socio-economic) gradient" when the estimated relationship between student performance and student socioeconomic background does not include control variables.

- The (socio-economic) gradient can be called "net (socioeconomic) gradient" when the estimated relationship between student performance and student socioeconomic background includes control variables (individual control variables: gender, migration status, language spoken at home)

- **Wage penalty:** The wage penalty is the percentage decrease in the offspring's wage associated with having a father with less than upper-secondary education relative to an offspring whose father had upper-secondary education. A larger penalty indicates that a father's education more strongly influences his offspring's wages and can be interpreted as stronger persistence in wages.

  - The **standardised wage penalty** corresponds to the wage penalty, multiplied by the ratio of the standard deviation of a fathers' education to the standard deviation of sons' or daughters' gross hourly wage. The standard deviation of fathers' education is obtained by transforming the categorical measure of education into a continuous measure of education.

- **Wage premium:** The wage premium is the percentage increase in the offspring's adult wage associated with having a father with tertiary education relative to an offspring whose father had upper-secondary education. A larger premium indicates that a father's education more strongly influences their offspring's wages and can be interpreted as stronger persistence in wages.

  - The **standardised wage premium** corresponds to the wage premium, multiplied by the ratio of the standard deviation of fathers' education to the standard deviation of sons' or daughters' gross hourly wage. The standard deviation of fathers' education is obtained by transforming the categorical measure of education into a continuous measure of education.

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Table 1. **The influence of father's educational attainment on son's wage** [1]:
Selected European OECD countries

Dependent variable: hourly wages [2]

	Austria						Belgium						Denmark						Finland						France					
	Men, aged						Men, aged						Men, aged						Men, aged						Men, aged					
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
	Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education		
Low educated father	-0.025	-0.021	-0.169***	-0.002	-0.003	-0.116***	-0.127***	-0.122***	-0.148***	-0.052	-0.034	-0.063	0.052	-0.059	-0.134**	0.073	-0.039	-0.120**	0.010	0.023	-0.079	0.029	0.061	0.009	-0.107*	-0.129*	-0.393***	-0.025	-0.067	-0.224***
	[0.029]	[0.033]	[0.039]	[0.029]	[0.032]	[0.038]	[0.037]	[0.034]	[0.048]	[0.035]	[0.033]	[0.044]	[0.059]	[0.045]	[0.055]	[0.061]	[0.044]	[0.059]	[0.047]	[0.057]	[0.109]	[0.047]	[0.052]	[0.105]	[0.056]	[0.067]	[0.083]	[0.057]	[0.071]	[0.081]
High educated father	0.050	0.016	0.017	0.033	-0.018	0.002	0.035	0.088*	0.171**	-0.025	0.024	-0.002	-0.018	0.023	-0.001	-0.024	-0.036	-0.126**	0.050	0.180*	0.140	0.044	0.101	0.137	-0.033	0.057	-0.064	-0.086	-0.043	-0.161
	[0.103]	[0.130]	[0.174]	[0.104]	[0.109]	[0.136]	[0.043]	[0.045]	[0.077]	[0.041]	[0.042]	[0.070]	[0.113]	[0.065]	[0.062]	[0.109]	[0.065]	[0.061]	[0.050]	[0.094]	[0.131]	[0.048]	[0.090]	[0.124]	[0.085]	[0.095]	[0.128]	[0.087]	[0.099]	[0.118]
Low educated				-0.042	-0.122**	-0.281***				-0.107**	-0.079***	-0.213***				-0.161	-0.092	0.031				-0.069	-0.108	-0.307***				-0.008	0.013	-0.118**
				[0.054]	[0.057]	[0.065]				[0.048]	[0.030]	[0.039]				[0.136]	[0.066]	[0.082]				[0.082]	[0.070]	[0.106]				[0.067]	[0.038]	[0.048]
High educated				0.167***	0.284***	0.313***				0.228***	0.260***	0.256***				0.056	0.176***	0.321***				0.152***	0.342***	0.263***				0.213***	0.338***	0.364***
				[0.042]	[0.040]	[0.046]				[0.030]	[0.029]	[0.041]				[0.086]	[0.053]	[0.045]				[0.041]	[0.051]	[0.052]				[0.038]	[0.053]	[0.047]
Number of observations	533	735	550	533	735	550	501	632	541	475	600	509	319	436	353	316	432	351	439	489	461	439	489	461	952	1113	1017	872	992	886

	Greece						Ireland						Italy						Luxembourg						Netherlands					
	Men, aged						Men, aged						Men, aged						Men, aged						Men, aged					
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
	Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education		
Low educated father	-0.078	-0.121*	-0.222*	-0.001	0.002	-0.019	-0.121	-0.331***	-0.321***	-0.076	-0.150*	-0.124	-0.129***	-0.192***	-0.438***	-0.053*	-0.077*	-0.116***	-0.240***	-0.309***	-0.305***	-0.100	-0.121*	-0.148**	0.123	-0.164***	-0.223***	0.151*	-0.071*	-0.082
	[0.059]	[0.068]	[0.115]	[0.061]	[0.060]	[0.100]	[0.103]	[0.091]	[0.114]	[0.095]	[0.086]	[0.103]	[0.027]	[0.042]	[0.051]	[0.029]	[0.042]	[0.044]	[0.067]	[0.078]	[0.076]	[0.073]	[0.068]	[0.064]	[0.080]	[0.050]	[0.078]	[0.079]	[0.043]	[0.076]
High educated father	0.135	-0.029	0.156	0.113	-0.108	0.061	0.052	-0.085	-0.094	-0.016	-0.164	-0.201	0.087	0.231***	0.044	0.032	0.126	-0.006	0.174*	0.084	0.343**	0.001	-0.059	0.077	0.023	0.094	0.189**	-0.012	0.016	0.110
	[0.087]	[0.109]	[0.172]	[0.078]	[0.104]	[0.146]	[0.127]	[0.126]	[0.245]	[0.130]	[0.126]	[0.245]	[0.073]	[0.086]	[0.147]	[0.071]	[0.079]	[0.135]	[0.093]	[0.176]	[0.133]	[0.080]	[0.166]	[0.129]	[0.105]	[0.074]	[0.086]	[0.106]	[0.066]	[0.081]
Low educated				-0.048	-0.128***	-0.194***				-0.098	-0.090	-0.203***				-0.124***	-0.163***	-0.241***				-0.257***	-0.386***	-0.307***				-0.101**	-0.108**	-0.265***
				[0.039]	[0.038]	[0.044]				[0.098]	[0.069]	[0.069]				[0.023]	[0.020]	[0.023]				[0.055]	[0.066]	[0.066]				[0.049]	[0.044]	[0.049]
High educated				0.252***	0.316***	0.371***				0.230***	0.368***	0.405***				0.129***	0.268***	0.421***				0.314***	0.329***	0.386***				0.118*	0.401***	0.307***
				[0.048]	[0.047]	[0.058]				[0.079]	[0.062]	[0.081]				[0.035]	[0.035]	[0.041]				[0.089]	[0.080]	[0.075]				[0.060]	[0.047]	[0.086]
Number of observations	528	547	464	526	547	462	214	337	338	213	336	335	2078	2475	2080	2076	2473	2080	556	505	454	553	500	450	459	603	460	452	602	458

	Portugal						Spain						Sweden						United Kingdom					
	Men, aged						Men, aged						Men, aged						Men, aged					
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
	Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education			Without controlling for own education			Controlling for own education		
Low educated father	-0.376***	-0.411**	-0.710***	-0.108	-0.007	-0.012	-0.136***	-0.177***	-0.334***	-0.076*	-0.031	-0.124*	0.047	-0.089	-0.061	0.065	-0.064	0.100	-0.082*	-0.162***	-0.206***	-0.075	-0.094*	-0.105
	[0.099]	[0.175]	[0.212]	[0.084]	[0.188]	[0.242]	[0.037]	[0.056]	[0.072]	[0.040]	[0.048]	[0.067]	[0.064]	[0.070]	[0.101]	[0.063]	[0.074]	[0.118]	[0.050]	[0.058]	[0.070]	[0.048]	[0.054]	[0.066]
High educated father	0.192	0.739***	0.131	0.141	0.490**	0.053	0.087	0.196***	0.241**	0.038	0.128**	0.151*	-0.075	0.116	0.277**	-0.115	0.091	0.272**	0.080	0.313***	0.309***	0.019	0.223***	0.159
	[0.142]	[0.201]	[0.344]	[0.136]	[0.209]	[0.340]	[0.057]	[0.076]	[0.096]	[0.055]	[0.063]	[0.089]	[0.098]	[0.104]	[0.137]	[0.099]	[0.105]	[0.134]	[0.059]	[0.077]	[0.102]	[0.059]	[0.072]	[0.097]
Low educated				-0.220***	-0.451***	-0.739***				-0.060**	-0.167***	-0.260***				0.044	-0.004	-0.063				-0.121	-0.334***	-0.331***
				[0.055]	[0.070]	[0.097]				[0.029]	[0.031]	[0.037]				[0.053]	[0.099]	[0.054]				[0.090]	[0.077]	[0.073]
High educated				0.369***	0.489***	0.344***				0.196***	0.340***	0.286***				0.119*	0.135*	0.352***				0.216***	0.367***	0.369***
				[0.078]	[0.093]	[0.116]				[0.034]	[0.036]	[0.044]				[0.065]	[0.070]	[0.068]				[0.043]	[0.048]	[0.062]
Number of observations	465	482	404	458	467	389	1469	1635	1277	1465	1621	1255	330	335	325	329	335	325	493	565	523	493	564	523

1. The estimated model is: $\ln W = \alpha + aE + bEC + X + \varepsilon$ where lnW is the log of individual's gross hourly wage, E is father's education, EC is individual's education (when applicable) and X is individual control variables (the degree of urbanisation of the living area, marital status, and migration background). Country-by-country, cohort-by-cohort OLS wage regressions weighted by individual sampling probability. Robust standard errors .

2. Gross hourly wages for employees . Wages and salaries paid in cash for time worked or work done in main and any secondary or casual job and remuneration for time not worked (day payments) as well as additional payments such as overtime payments, monetary bonuses etc.

Germany is not included in this table, as there is a problem with the representativeness of the German sample along the education dimension.
*** p<0.01, ** p<0.05, * p<0.1. All regressions include a constant
Source: OECD calculations based on the 2005 EU-SILC Database.

Table 2. **The marginal effect of father's education on the probability to achieve a certain level of education, men[1]: Selected European OECD countries**

Dependent variable: Adult education level

	Austria									Belgium									Denmark								
	Probability to have									Probability to have									Probability to have								
	Low education			Medium education			High education			Low education			Medium education			High education			Low education			Medium education			High education		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
Low educated father	0.063***	0.029**	0.050***	0.045**	0.024*	0.037**	-0.108***	-0.053*	-0.087***	0.129***	0.198***	0.211***	0.129***	0.087***	0.041**	-0.258***	-0.284***	-0.252***	0.050	0.078**	0.073*	0.009	-0.016	-0.011	-0.059	-0.062**	-0.062*
	(0.019)	(0.015)	(0.016)	(0.018)	(0.013)	(0.015)	(0.034)	(0.027)	(0.030)	(0.024)	(0.025)	(0.031)	(0.032)	(0.021)	(0.018)	(0.050)	(0.040)	(0.045)	(0.042)	(0.038)	(0.043)	(0.008)	(0.010)	(0.009)	(0.046)	(0.030)	(0.036)
High educated father	-0.031*	-0.028	-0.055***	-0.101	-0.050	-0.197	0.132	0.078	0.252*	-0.047***	-0.055***	-0.111***	-0.224***	-0.109***	-0.168***	0.271***	0.165***	0.280***	-0.081***	-0.160***	-0.176***	-0.086*	-0.119***	-0.168***	0.167**	0.279***	0.343***
	(0.017)	(0.028)	(0.018)	(0.077)	(0.068)	(0.129)	(0.092)	(0.095)	(0.144)	(0.014)	(0.019)	(0.028)	(0.045)	(0.039)	(0.049)	(0.055)	(0.056)	(0.073)	(0.028)	(0.031)	(0.031)	(0.047)	(0.037)	(0.051)	(0.071)	(0.058)	(0.070)
Number of observations	619	912	777	619	912	777	619	912	777	580	765	730	580	765	730	580	765	730	348	533	452	348	533	452	348	533	452

	Finland									France									Greece								
	Probability to have									Probability to have									Probability to have								
	Low education			Medium education			High education			Low education			Medium education			High education			Low education			Medium education			High education		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
Low educated father	0.067**	0.045**	0.133***	0.052**	0.042	0.063*	-0.118**	-0.087*	-0.196***	0.052***	0.073***	0.143***	0.180***	0.108**	0.030	-0.233***	-0.181***	-0.173***	0.180***	0.267***	0.337***	0.038	0.052	-0.005	-0.218***	-0.319***	-0.332***
	(0.028)	(0.022)	(0.036)	(0.025)	(0.026)	(0.036)	(0.050)	(0.047)	(0.070)	(0.010)	(0.018)	(0.033)	(0.053)	(0.048)	(0.029)	(0.061)	(0.064)	(0.061)	(0.027)	(0.035)	(0.059)	(0.024)	(0.037)	(0.038)	(0.045)	(0.067)	(0.094)
High educated father	-0.006	-0.064***	-0.030	-0.008	-0.209***	-0.044	0.014	0.272***	0.074	-0.016**	-0.028*	-0.088***	-0.215***	-0.142*	-0.219***	0.231***	0.170*	0.307***	-0.054**	-0.053	-0.021	-0.108*	-0.093	-0.016	0.162**	0.147	0.037
	(0.026)	(0.020)	(0.040)	(0.039)	(0.052)	(0.058)	(0.065)	(0.067)	(0.098)	(0.008)	(0.017)	(0.033)	(0.067)	(0.073)	(0.068)	(0.073)	(0.087)	(0.093)	(0.025)	(0.038)	(0.108)	(0.056)	(0.069)	(0.086)	(0.079)	(0.105)	(0.194)
Number of observations	555	788	934	555	788	934	555	788	934	1014	1244	1206	1014	1244	1206	1014	1244	1206	876	950	916	876	950	916	876	950	916

	Ireland									Italy									Luxembourg								
	Probability to have									Probability to have									Probability to have								
	Low education			Medium education			High education			Low education			Medium education			High education			Low education			Medium education			High education		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
Low educated father	0.136***	0.351***	0.278***	0.103**	0.079**	-0.020	-0.239***	-0.429***	-0.257**	0.287***	0.332***	0.457***	-0.094***	-0.101***	-0.049**	-0.193***	-0.232***	-0.408***	0.251***	0.237***	0.246***	-0.022	-0.022	-0.072***	-0.229***	-0.216***	-0.174***
	(0.045)	(0.043)	(0.086)	(0.041)	(0.031)	(0.021)	(0.079)	(0.063)	(0.103)	(0.022)	(0.022)	(0.023)	(0.010)	(0.010)	(0.020)	(0.023)	(0.024)	(0.039)	(0.052)	(0.044)	(0.048)	(0.024)	(0.023)	(0.023)	(0.053)	(0.041)	(0.044)
High educated father	-0.072**	-0.083***	-0.237***	-0.183***	-0.147***	-0.220***	0.255***	0.230***	0.457***	-0.159***	-0.145***	-0.052	-0.249***	-0.170***	-0.068	0.408***	0.315***	0.121	-0.158***	-0.137***	-0.177***	-0.285***	-0.310***	-0.409***	0.444***	0.446***	0.587***
	(0.029)	(0.030)	(0.082)	(0.063)	(0.046)	(0.056)	(0.085)	(0.073)	(0.120)	(0.021)	(0.022)	(0.032)	(0.043)	(0.039)	(0.048)	(0.055)	(0.056)	(0.080)	(0.035)	(0.026)	(0.039)	(0.076)	(0.084)	(0.085)	(0.090)	(0.095)	(0.095)
Number of observations	265	514	560	265	514	560	265	514	560	3301	3953	3419	3301	3953	3419	3301	3953	3419	639	613	592	639	613	592	639	613	592

1. The estimated model is : EC = j + dE + gX + ε where EC is indivisual's education, E is father's education and X is individual control variables (the degree of urbanisation of the living area, migration status, number of siblings, family composition when a teenager). The table reports the marginal effect of father's education on the probability to achieve respectively low, medium and high education.

Example: Having a low-educated father increases the probability to attain low education by 6.3 percentage points relative to having a medium-educated father and decreases the probability to attain high education by 10.8 percentage points relative to having a medium-educated father for a 25-34 year-old Austrian man.

Computed from the ordered probit coefficients reported in Annex 3. Robust standard errors.

Germany is not included in this table, as there is a problem with the representativeness of the German sample along the education dimension.

*** p<0.01, ** p<0.05, * p<0.1.

Source: OECD calculations based on the 2005 EU-SILC Database.

Table 2. **The marginal effect of father's education on the probability to achieve a certain level of education, men [1]: Selected European OECD countries** (continued)

Dependent variable: Adult education level

	Netherlands									Portugal									Spain								
	Probability to have									Probability to have									Probability to have								
	Low education			Medium education			High education			Low education			Medium education			High education			Low education			Medium education			High education		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
Low educated father	0.052	0.110***	0.190***	0.038	0.047**	0.058***	-0.091	-0.157***	-0.247***	0.482***	0.264*	0.620***	-0.113***	-0.125**	-0.104***	-0.369***	-0.138	-0.516***	0.210***	0.300***	0.372***	0.001	-0.026**	-0.031**	-0.211***	-0.275***	-0.342***
	(0.033)	(0.031)	(0.035)	(0.029)	(0.021)	(0.022)	(0.061)	(0.049)	(0.052)	(0.069)	(0.141)	(0.113)	(0.026)	(0.049)	(0.040)	(0.083)	(0.095)	(0.148)	(0.035)	(0.039)	(0.043)	(0.009)	(0.010)	(0.013)	(0.041)	(0.046)	(0.054)
High educated father	-0.081***	-0.084***	-0.094***	-0.152***	-0.125***	-0.160***	0.234***	0.210***	0.254***	-0.187***	-0.272	-0.152	-0.137***	0.039	-0.088	0.324***	0.233*	0.240	-0.166***	-0.137***	-0.137***	-0.110***	-0.073***	-0.078***	0.276***	0.209***	0.216***
	(0.029)	(0.028)	(0.029)	(0.045)	(0.041)	(0.056)	(0.069)	(0.066)	(0.080)	(0.072)	(0.169)	(0.129)	(0.051)	(0.048)	(0.074)	(0.113)	(0.141)	(0.196)	(0.035)	(0.042)	(0.048)	(0.023)	(0.021)	(0.027)	(0.054)	(0.060)	(0.073)
Number of observations	456	698	569	456	698	569	456	698	569	598	720	672	598	720	672	598	720	672	2089	2393	2032	2089	2393	2032	2089	2393	2032

	Sweden									United Kingdom								
	Probability to have									Probability to have								
	Low education			Medium education			High education			Low education			Medium education			High education		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
Low educated father	0.044***	0.071***	0.171***	0.097**	0.179***	0.223**	-0.142**	-0.250***	-0.394***	0.017	0.067***	0.117***	0.031	0.080***	0.035**	-0.048	-0.148***	-0.152***
	(0.017)	(0.015)	(0.026)	(0.045)	(0.055)	(0.092)	(0.059)	(0.064)	(0.107)	(0.017)	(0.017)	(0.026)	(0.032)	(0.026)	(0.016)	(0.048)	(0.041)	(0.039)
High educated father	-0.024**	-0.011	0.008	-0.188***	-0.143*	0.044	0.212***	0.154*	-0.052	-0.052***	-0.048***	-0.109***	-0.211***	-0.187***	-0.247***	0.263***	0.235***	0.356***
	(0.011)	(0.008)	(0.023)	(0.073)	(0.081)	(0.118)	(0.081)	(0.088)	(0.141)	(0.014)	(0.014)	(0.022)	(0.046)	(0.048)	(0.044)	(0.056)	(0.058)	(0.058)
Number of observations	400	445	435	400	445	435	400	445	435	557	711	720	557	711	720	557	711	720

1. The estimated model is : EC = j + dE + gX + ε where EC is indivisual's education, E is father's education and X is individual control variables (the degree of urbanisation of the living area, migration status, number of siblings, family composition when a teenager). The table reports the marginal effect of father's education on the probability to achieve respectively low, medium and high education.

Example: Having a low-educated father increases the probability to attain low education by 6.3 percentage points relative to having a medium-educated father and decreases the probability to attain high education by 10.8 percentage points relative to having a medium-educated father for a 25-34 year-old Austrian man.

Computed from the ordered probit coefficients reported in Annex 3. Robust standard errors.
Germany is not included in this table, as there is a problem with the representativeness of the German sample along the education dimension.
*** p<0.01, ** p<0.05, * p<0.1.
Source: OECD calculations based on the 2005 EU-SILC Database.

Table 3. **Estimates of the socio-economic gradient[1] in OECD countries**
Impact of parental background on PISA science scores of teen-agers

	Australia	Austria	Belgium	Canada	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Japan
Parental background	42.882***	46.357***	47.317***	33.460***	50.518***	38.502***	31.443***	54.263***	46.577***	37.266***	44.297***	27.761***	39.416***	28.835***	38.455***
	[1.491]	[3.047]	[1.750]	[1.361]	[2.452]	[1.845]	[1.541]	[2.358]	[1.940]	[2.266]	[1.787]	[1.740]	[2.073]	[1.460]	[2.567]
Constant	518.880***	502.083***	503.292***	524.224***	512.109***	485.292***	556.105***	502.100***	504.503***	479.476***	508.300***	470.443***	510.012***	531.348***	533.510***
	[1.665]	[3.711]	[2.207]	[1.796]	[3.111]	[2.334]	[1.738]	[2.661]	[3.020]	[2.482]	[2.130]	[1.891]	[2.344]	[3.214]	[3.193]
Number of observations	13995	4914	8777	22136	5903	4496	4697	4606	4686	4862	4474	3745	4501	21683	5862
R-squared	0.113	0.158	0.193	0.084	0.154	0.139	0.084	0.215	0.191	0.153	0.215	0.064	0.127	0.190	0.074

	Korea	Luxembourg	Mexico	Netherlands	New Zealand	Norway	Poland	Portugal	Slovak Republic	Spain	Sweden	Switzerland	Turkey	United Kingdom	United States
Parental background	31.831***	41.325***	24.990***	43.659***	52.220***	34.502***	39.843***	28.162***	44.673***	31.106***	38.190***	44.150***	31.025***	48.347***	48.878***
	[3.164]	[0.940]	[1.232]	[2.189]	[1.720]	[2.267]	[1.743]	[1.402]	[2.472]	[1.215]	[1.880]	[1.741]	[3.227]	[1.904]	[2.516]
Constant	522.320***	483.404***	434.546***	514.237***	527.292***	474.185***	509.795***	491.494***	495.121***	498.483***	496.045***	507.546***	463.751***	508.311***	482.840***
	[2.951]	[1.187]	[2.218]	[2.308]	[2.240]	[2.838]	[2.106]	[2.134]	[2.157]	[1.868]	[2.013]	[2.469]	[6.377]	[1.715]	[3.034]
Number of observations	5168	4488	30877	4838	4727	4602	5520	5091	4723	19499	4392	12136	4934	12806	5568
R-squared	0.082	0.220	0.166	0.168	0.166	0.076	0.147	0.166	0.189	0.136	0.106	0.158	0.166	0.139	0.176

1. The estimated model is: $y = \alpha + \beta F + \varepsilon$ where y is student's science performance and F is student PISA index of economic, social and cultural status (ESCS). Country-by-country least-squares regressions weighted by students' sampling probability. Regressions for Italy include regional fixed effects (not reported). Robust standard errors adjusted for clustering at the school level.

Example: In Australia, for each improvement of one international standard deviation in the parental socio-economic background, the student performance on the OECD PISA science scale improves by 43 points.

Balanced repeated replicate variance estimation, standard errors clustered by school in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Source: OECD calculations based on the 2006 OECD PISA Database.

Table 4. **Estimates of the socio-economic gradient[1] in OECD countries: school environment and individual background effects**

Impact of parental background on PISA science scores of teen-agers

	Australia	Austria	Belgium	Canada	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Japan
Individual background	30.424***	16.279***	20.645***	25.679***	24.097***	33.675***	30.330***	23.415***	19.535***	19.268***	11.205***	28.341***	30.177***	10.885***	8.987***
	[1.405]	[1.661]	[1.032]	[1.297]	[1.570]	[1.523]	[1.498]	[1.774]	[1.179]	[1.471]	[1.434]	[1.857]	[1.722]	[1.012]	[1.965]
School environment	53.140***	103.910***	101.220***	39.427***	110.141***	36.766***	11.972**	98.903***	107.591***	59.354***	82.570***	-6.836	43.813***	75.631***	125.737***
	[4.244]	[6.053]	[5.052]	[4.464]	[6.855]	[6.943]	[5.716]	[4.683]	[5.297]	[4.981]	[4.884]	[4.142]	[5.253]	[5.158]	[8.698]
Constant	510.484***	487.508***	490.381***	512.577***	509.669***	475.406***	553.324***	508.298***	480.865***	485.832***	512.492***	474.953***	510.543***	526.669***	534.546***
	[1.512]	[3.285]	[2.594]	[2.427]	[3.335]	[3.110]	[1.946]	[3.164]	[2.887]	[2.528]	[2.660]	[3.451]	[2.114]	[4.650]	[3.090]
Number of observations	13995	4908	8777	22132	5902	4496	4697	4606	4686	4861	4462	3733	4501	21678	5862
R-squared	0.147	0.348	0.387	0.107	0.314	0.160	0.085	0.388	0.421	0.249	0.410	0.063	0.158	0.316	0.236

	Korea	Luxembourg	Mexico	Netherlands	New Zealand	Norway	Poland	Portugal	Slovak Republic	Spain	Sweden	Switzerland	Turkey	United Kingdom	United States
Individual background	11.492***	24.889***	7.947***	14.972***	42.907***	30.925***	36.362***	18.534***	23.251***	24.636***	34.299***	29.721***	10.755***	34.645***	35.111***
	[1.694]	[1.089]	[0.749]	[1.175]	[1.768]	[1.798]	[1.483]	[1.187]	[1.689]	[1.187]	[2.335]	[1.401]	[1.121]	[1.983]	[1.726]
School environment	80.049***	70.134***	35.939***	120.000***	50.897***	29.559***	15.842***	30.693***	64.124***	21.949***	33.414***	75.539***	65.692***	65.766***	51.149***
	[7.950]	[2.281]	[2.183]	[5.317]	[5.452]	[8.123]	[5.289]	[3.233]	[7.216]	[2.638]	[7.546]	[5.971]	[4.937]	[4.704]	[7.092]
Constant	522.712***	478.659***	453.385***	491.176***	522.973***	463.253***	513.414***	504.485***	501.467***	503.282***	489.080***	502.251***	521.766***	498.342***	477.770***
	[2.573]	[1.126]	[2.207]	[2.819]	[2.311]	[4.967]	[2.473]	[2.292]	[2.172]	[1.862]	[2.858]	[2.022]	[7.599]	[2.028]	[3.102]
Number of observations	5168	4488	30869	4838	4727	4601	5502	5091	4723	19499	4386	12136	4934	12806	5568
R-squared	0.193	0.336	0.262	0.439	0.194	0.084	0.151	0.214	0.288	0.152	0.119	0.249	0.344	0.189	0.218

1. The estimated model is: $y = \alpha + \beta_w F + \beta_b F_{school} + \varepsilon$ where y is student's science performance, F is student ESCS and F_{school} is school-level ESCS (average across students in the same school, excluding the individual student for whom the regression is run). Regressions for Italy include regional fixed effects (not reported). Country-by-country least-squares regressions weighted by students' sampling probability. Robust standard errors adjusted for clustering at the school level.

Example: In Australia, for each improvement of one international standard deviation in the individual socio-economic background, the student performance on the OECD PISA science scale improves by 30 points, within a given school socio-economic environment. In Australia, for each improvement of one international standard deviation in the school socio-economic environment, the student performance on the OECD PISA science scale improves by 53 points, for a given level of individual socio-economic background.

Balanced repeated replicate variance estimation, standard errors clustered by school in brackets, *** p<0.01, ** p<0.05, * p<0.1. All regressions include a constant.

Source: OECD calculations based on the 2006 OECD PISA Database.

Table 5. **The effect of increased mobility on long-run growth**

	Short-fall in schooling explained fully by background (Percent)	Short-fall in schooling explained fully 1/2 by background (Percent)	Short-fall in schooling explained fully 1/5 by background (Percent)
High influence of education on long-run GDP (7%)	2.2	1.1	0.4
Moderate influence of education on long-run GDP (5.5%)	1.7	0.9	0.3
Low influence of education on long-run GDP (4%)	1.3	0.6	0.2

Source: OECD calculations.

Figure 1. **Some links between parental background and offspring's outcomes**

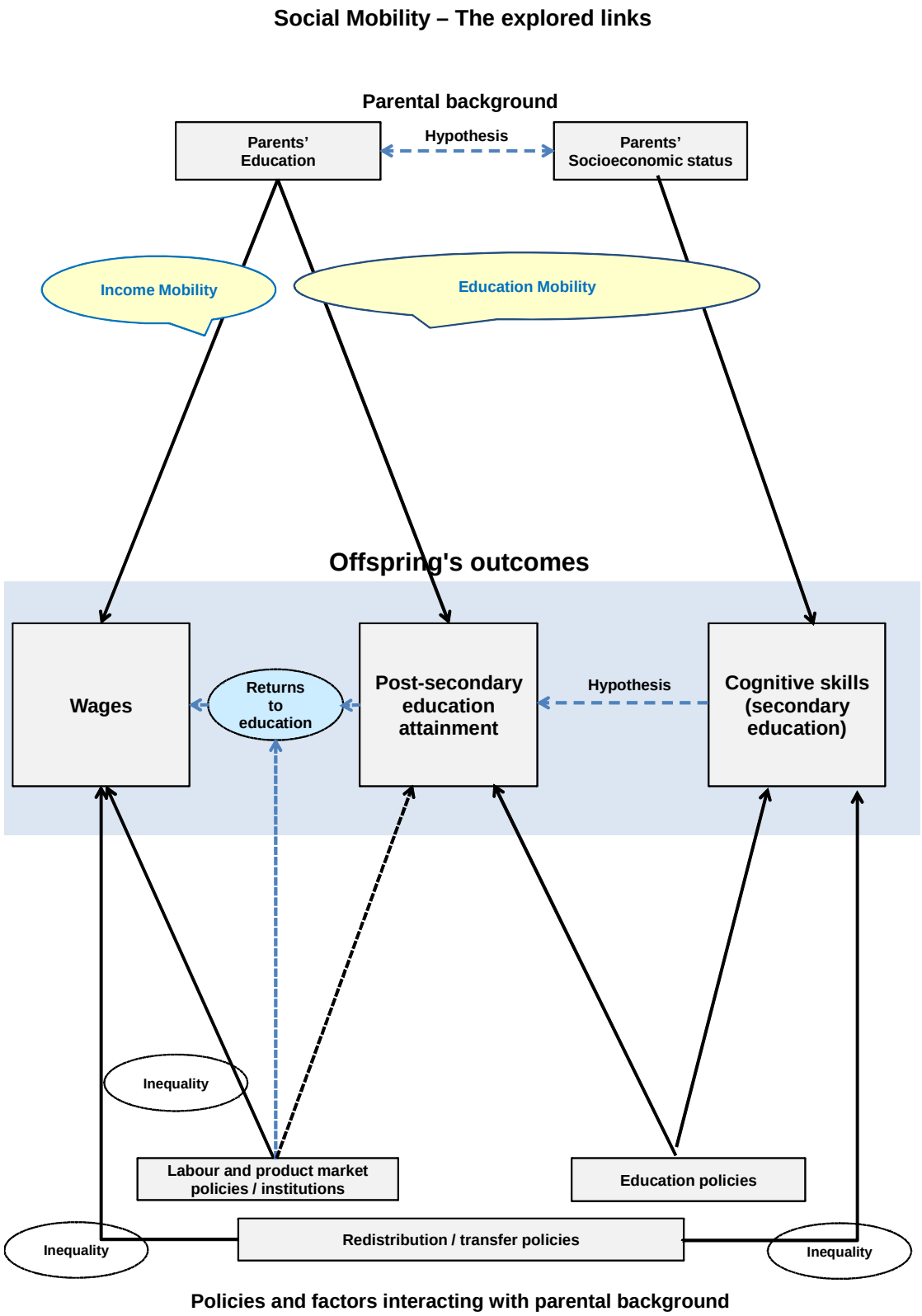
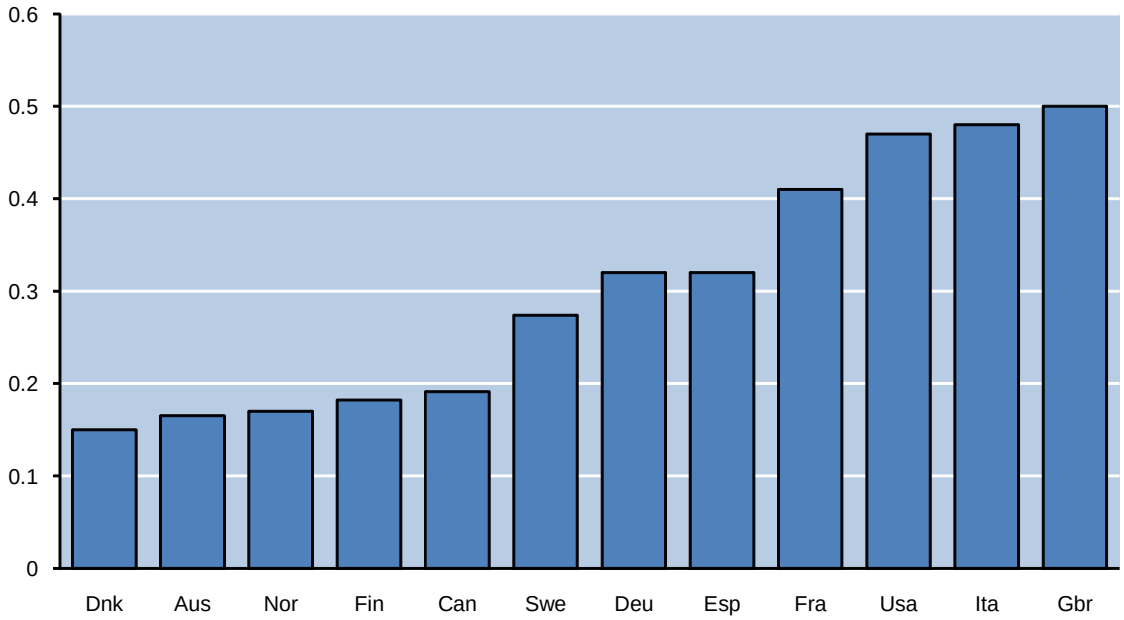


Figure 2. **Intergenerational earnings elasticity[1], estimates from various studies: Selected OECD countries**

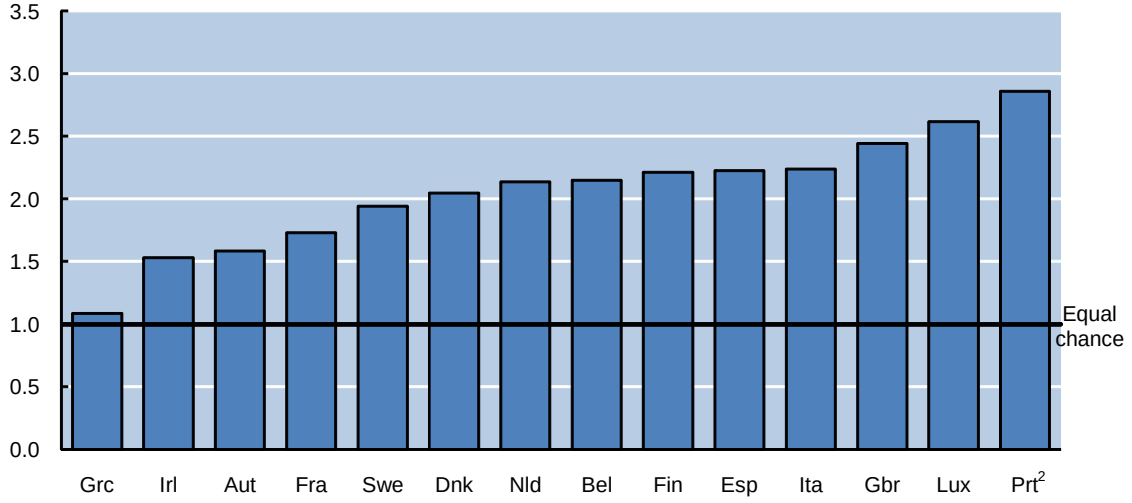


1. The height of each bar measures the extent to which son's earnings levels reflect those of their fathers. The estimates are the best point estimate of the intergenerational earnings elasticity resulting from an extensive meta-analysis carried out by Corak (2006) and supplemented with additional countries from d'Addio (2007). The choice of empirical estimates in this meta-analysis is motivated by the fact that they are based on studies that are similar in their estimation technique, sample and variable definitions.The higher the value, the greater is the persistence of earnings across generations, thus the lower is the intergenerational earnings mobility.

Source: D'Addio (2007).

Figure 3. **Ratio of the chance of being in the top wage quartile for sons of higher-educated vs. lower-educated fathers[1]: Selected European OECD countries**

Men, 35-44 years old



1. This figure shows the ratio of two conditional probabilities. It measures the ratio between the probability to end up in the top wage quartile given that the son's father had achieved tertiary education and the probability to end up in the top wage quartile given that the son's father had achieved less than upper-secondary education. Probabilities are defined as simple frequency measures. Father's educational achievement is a proxy for parental background or wages.

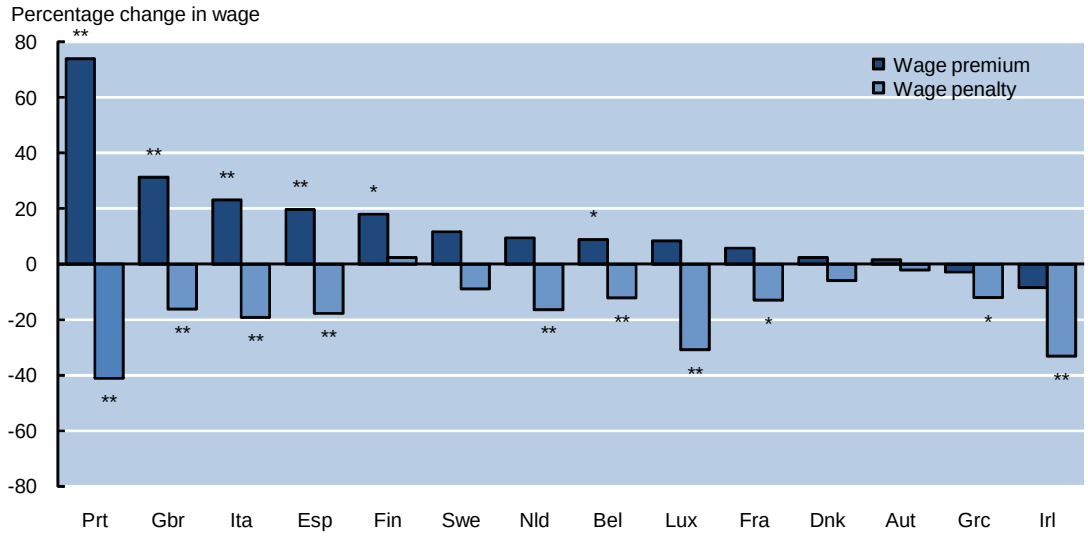
2. 25-34 years old for Portugal.

Germany is not included in this figure as there is a problem with the representativeness of the German sample along the education dimension.

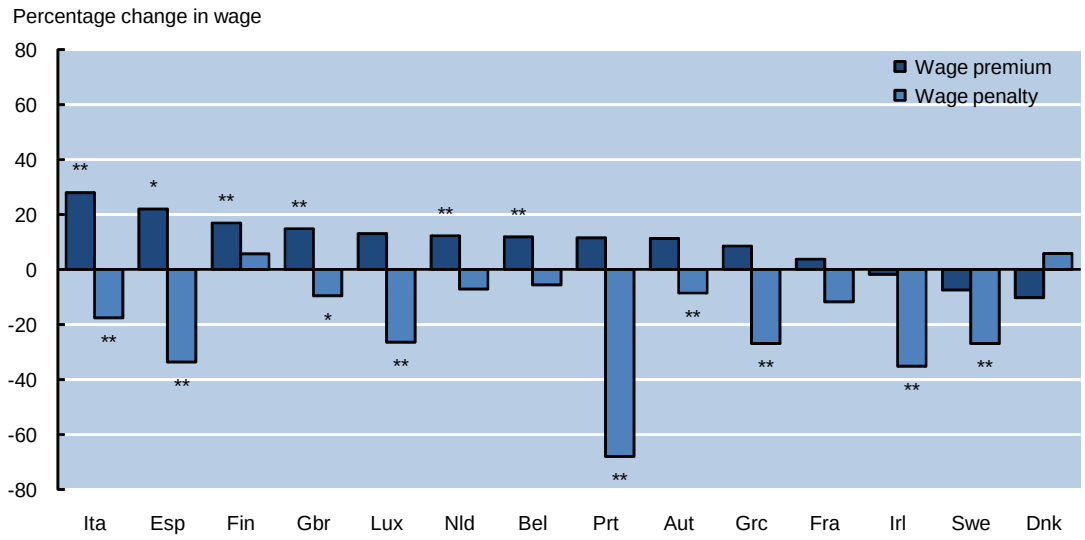
Source: OECD calculations based on the 2005 EU-SILC Database.

Figure 4. **Wage premium and penalty due to paternal educational levels[1]: Selected European OECD countries**

A. **Men, 35-44 years old[2]**



B. **Women, 35-44 years old[3]**



1. The figure shows the estimated percentage change in wages of the offspring depending on their parental background measured by father's highest education level. The wage premium is the increase in the offspring's wage of having a father with tertiary education relative to an offspring whose father had upper-secondary education. The wage penalty is the decrease in the offspring's wage of having a father with less than upper-secondary education relative to an offspring whose father had upper-secondary education. Father's educational achievement is a proxy for parental background or wage.

2. Based on OLS wage regression model.

3. Based on wage regression model with selection into paid employment (Heckman full maximum likelihood estimation).

Germany is not included in this figure, as there is a problem with the representativeness of the German sample along the education dimension.

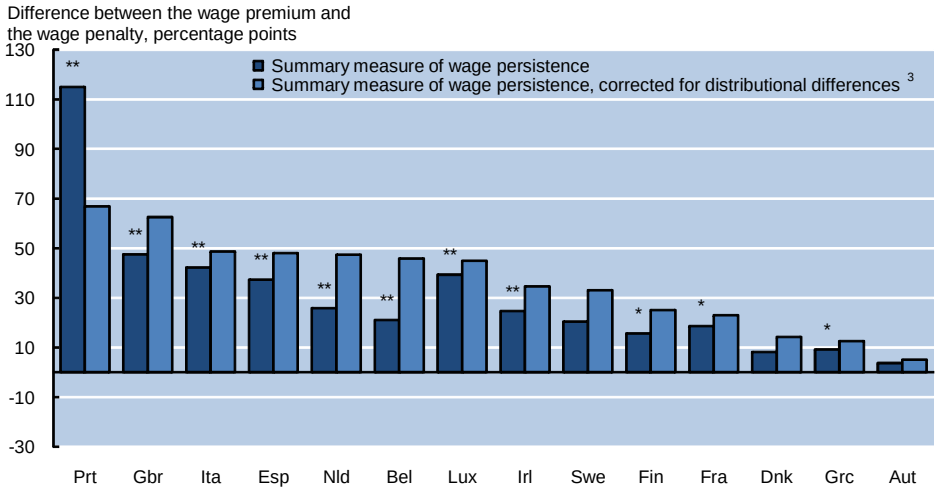
* denotes statistically significant at 10 % at least.

** denotes statistically significant at 5 % at least.

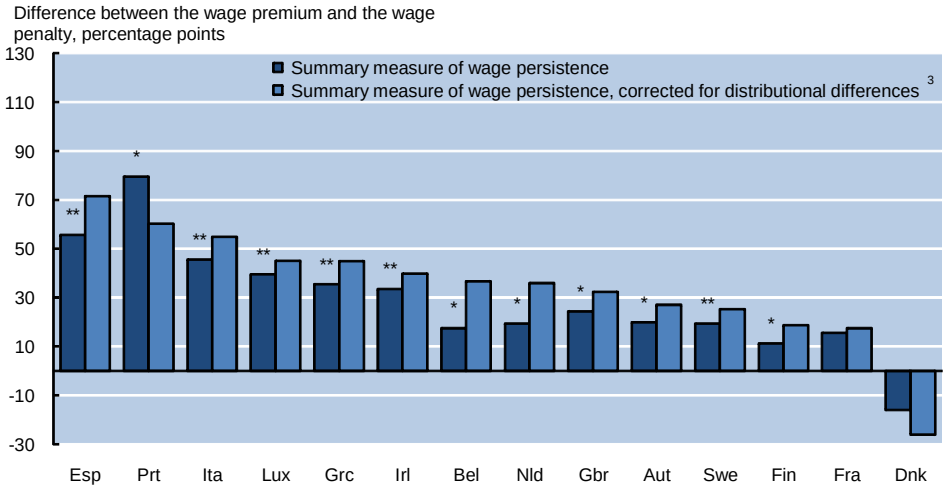
Source: OECD calculations based on the 2005 EU-SILC Database.

Figure 5. **Summary measure of wage persistence[1]: Selected European OECD countries**

Men, 35-44 years old[2]



Women, 35-44 years old[4]



1. Wage persistence is measured as the distance or gap between the estimated wage premium and penalty. Thus, it measures the percentage increase in wages of an offspring having a father with tertiary education relative to an offspring having a father with below-upper secondary education. A larger number implies a larger gap, thus stronger persistence in wages or a higher degree of immobility over generations. Father's educational achievement is a proxy for parental background or wage.

2. Based on OLS wage regression model.

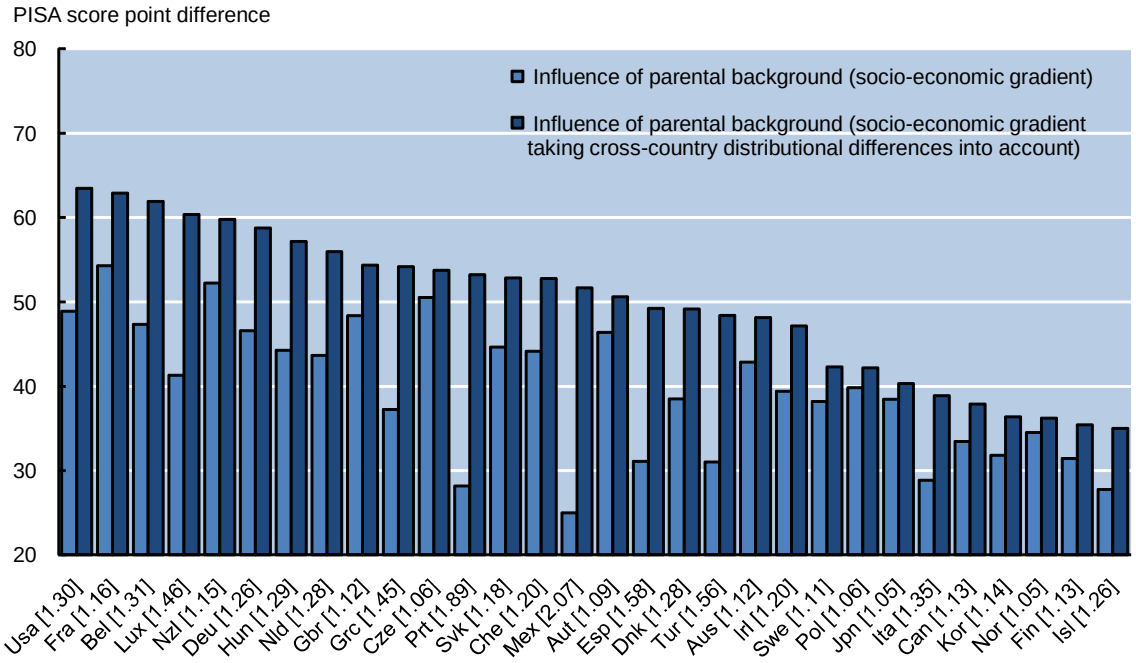
3. The summary measure of wage persistence, corrected for distributional differences, corresponds to the summary measure of wage persistence, multiplied by the ratio of the standard deviation of fathers' education to the standard deviation of sons' or daughters' gross hourly wage.

4. Based on wage regression model with selection into paid employment (Heckman full maximum likelihood

Germany is not included in this figure, as there is a problem with the representativeness of the German sample along the education dimension.

* denotes statistically significant at 10 % at least.
** denotes statistically significant at 5 % at least.
Source: OECD calculations based on the 2005 EU-SILC Database.

Figure 6. **The influence of parental background on secondary students' achievement**[1]



1. Regression of students' PISA science performance scores on their PISA economic, social and cultural Status (ESCS), a broad indicator of family's socio-economic background. Country-by-country least-squares regressions weighted by students' sampling probability. Robust standard errors adjusted for clustering at the school level. Regressions for Italy include regional fixed effects.

Socio-economic gradient: change in PISA science score due to an improvement of one international standard deviation in the PISA index of student socio-economic background. Socio-economic gradient taking cross-country distributional differences into account: change in PISA science score due to an improvement of one country-specific, inter-quartile change in the PISA index of student socio-economic background.

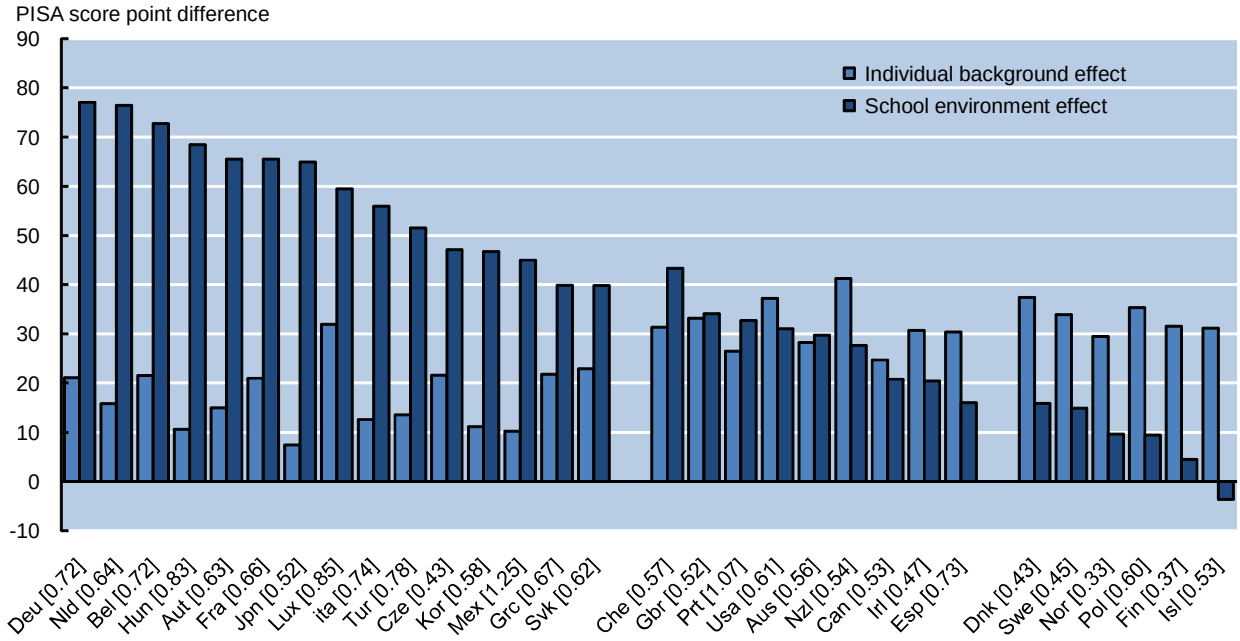
Data in brackets are values of the difference between the highest and the lowest quartiles of the country-specific distribution of the PISA index of economic, social and cultural status, calculated at the student-level.

Source: OECD calculations based on the 2006 OECD PISA Database.

Figure 7. **Effects of individual background and school socio-economic environment on students' secondary achievement**[1]

Socio-economic gradient taking cross-country distributional differences into account

(Differences in performance on the PISA science scale associated with the difference between the highest and the lowest quartiles of the country-specific distribution of the PISA index of economic, social and cultural status)



1. Regression of students' science performance on students' family socio-economic background (as measured by PISA ESCS), and school-level socio-economic background (average PISA ESCS across students in the same school, excluding the individual student for whom the regression is run). Country-by-country least-squares regressions weighted by students' sampling probability. Robust standard errors adjusted for clustering at the school level. Regressions for Italy include regional fixed effects.

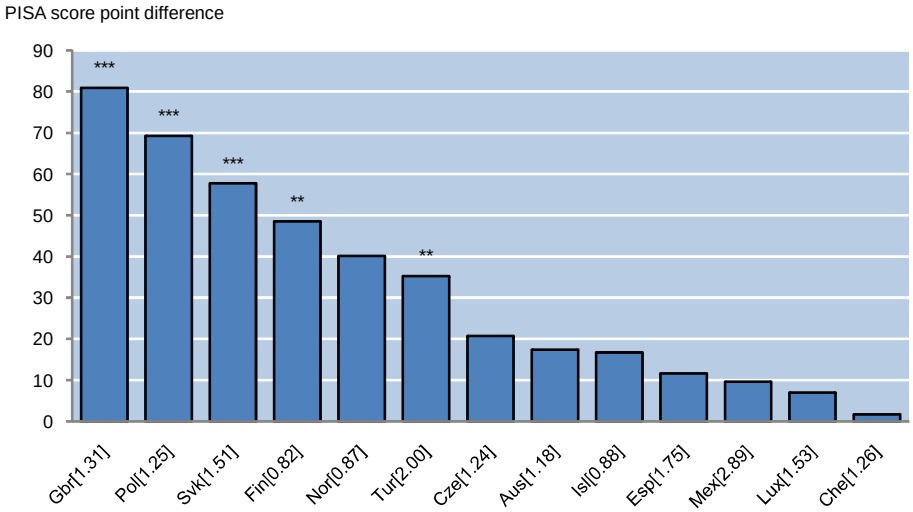
The individual background effect is defined as the difference in performance on the PISA science scale associated with the difference between the highest and the lowest quartiles of the average individual background effects distribution of the PISA index of economic, social and cultural status, calculated at the student- level. The school environment effect is defined as the difference in performance on the PISA science scale associated with the difference between the highest and the lowest quartiles of the country-specific school-level average distribution of the PISA index of economic, social and cultural status, calculated at the student-level.

Data in brackets are values of the difference between the highest and the lowest quartiles of the country-specific school-level average distribution of the PISA index of economic, social and cultural status, calculated at the student-level.

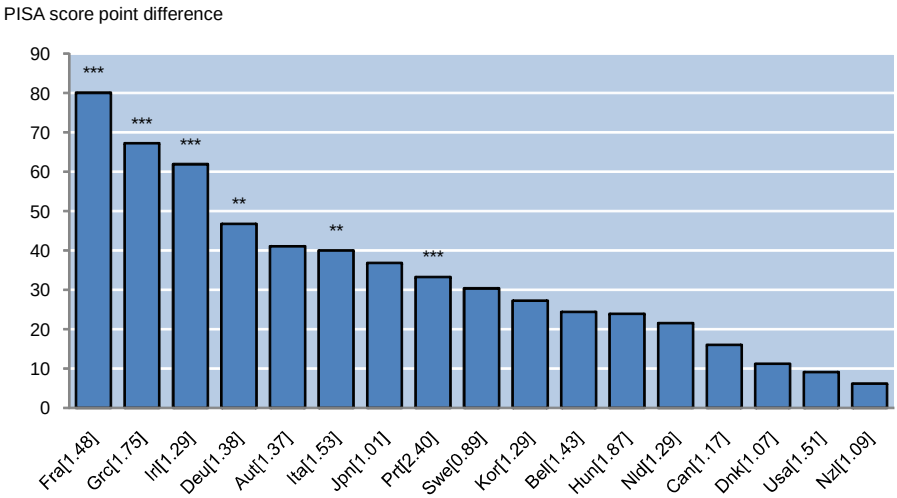
The negative school environment effect for Iceland is not statistically significant.
Source: OECD calculations based on the 2006 OECD PISA Database.

Figure 8. **The drivers of inequality in students' secondary educational achievement are often concentrated in top or bottom schools**

A. **Persistence driven by top schools**



B. **Persistence driven by bottom schools**



Absolute value of the difference in the school environment effect for students attending schools at the last decile of the school-level socio-economic background (top schools) and students attending schools at the first decile of the school-level (bottom schools). School-level socio-economic background is measured as the average PISA ESCS across students in the same school, excluding the individual student for whom the regression is run.

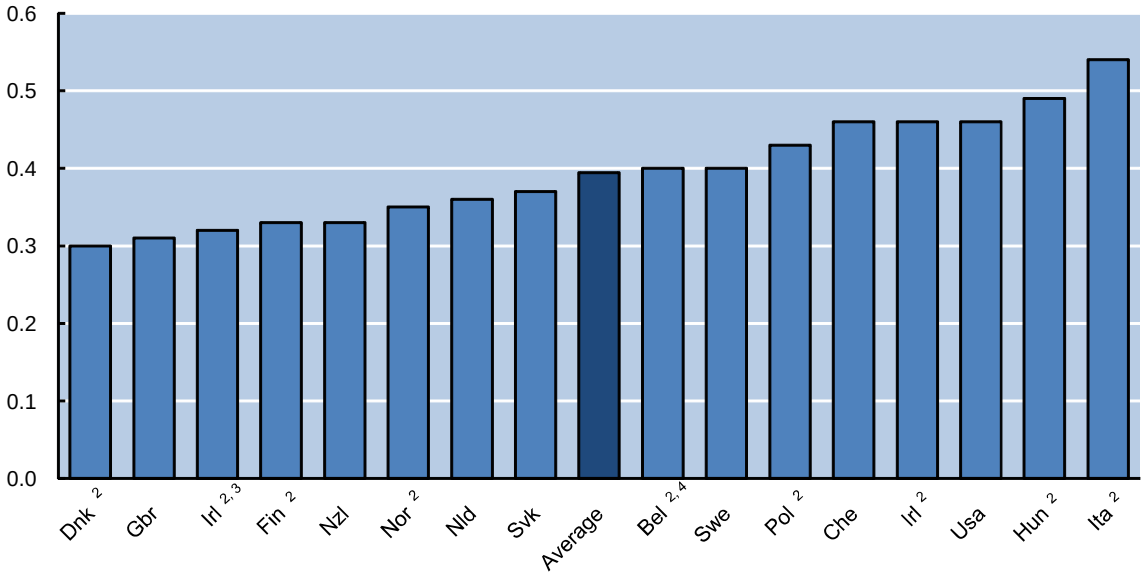
Regression of students' science performance on student ESCS, student ESCS squared, individual control variables (gender, migration status and language spoken at home), school-level ESCS and school-level ESCS squared. Country-by-country least-squares regressions weighted by students' sampling probability. Robust standard errors adjusted for clustering at the school level. Regressions for Italy include regional fixed effects.

Data in brackets are values of the difference between the 9th and the 1st deciles distribution of the country-specific school-level average distribution of the PISA index of economic, social and cultural status, calculated at the student-level.

*** p<0.01, ** p<0.05, * p<0.1.

Source: OECD calculations based on the 2006 OECD PISA Database.

Figure 9. **Intergenerational persistence in years of schooling**[1]

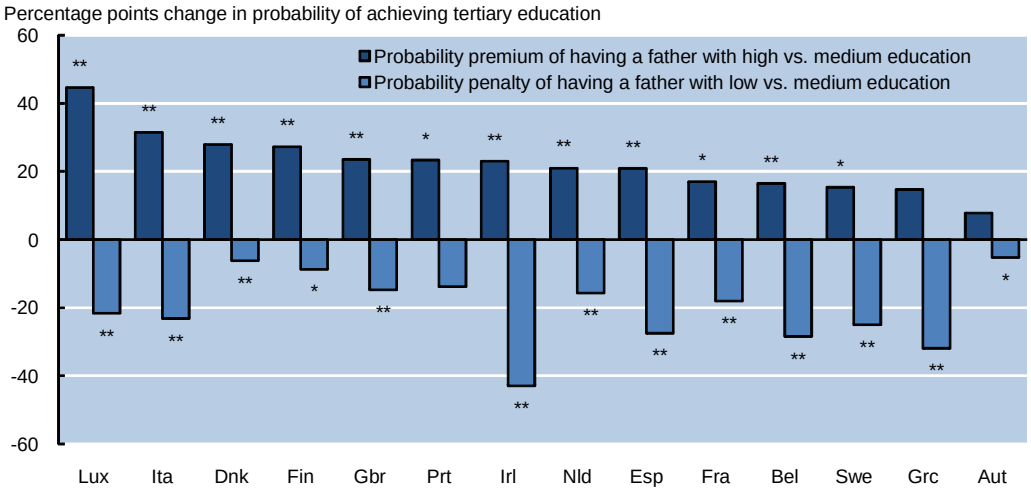


1. Correlation between parents and children's years of schooling. The correlation is the intergenerational education elasticity adjusted for the ratio of the standard deviations in years of schooling of parents and children. Data refers to men and women, age 20-69 years old.

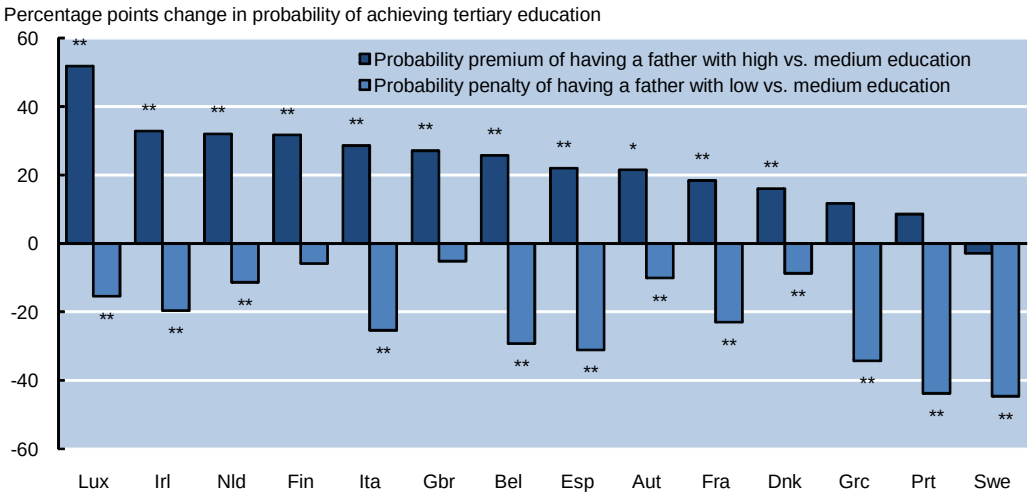
2. Ages 20 to 64 or 65 only; nine cohorts.
3. Northern Ireland.
4. Belgium (Flanders).
Source: Hertz *et al.* (2007).

Figure 10. **Probability premium and penalty of achieving tertiary education due to father's education levels[1]: Selected European OECD countries**

Men, 35-44 years old



Women, 35-44 years old



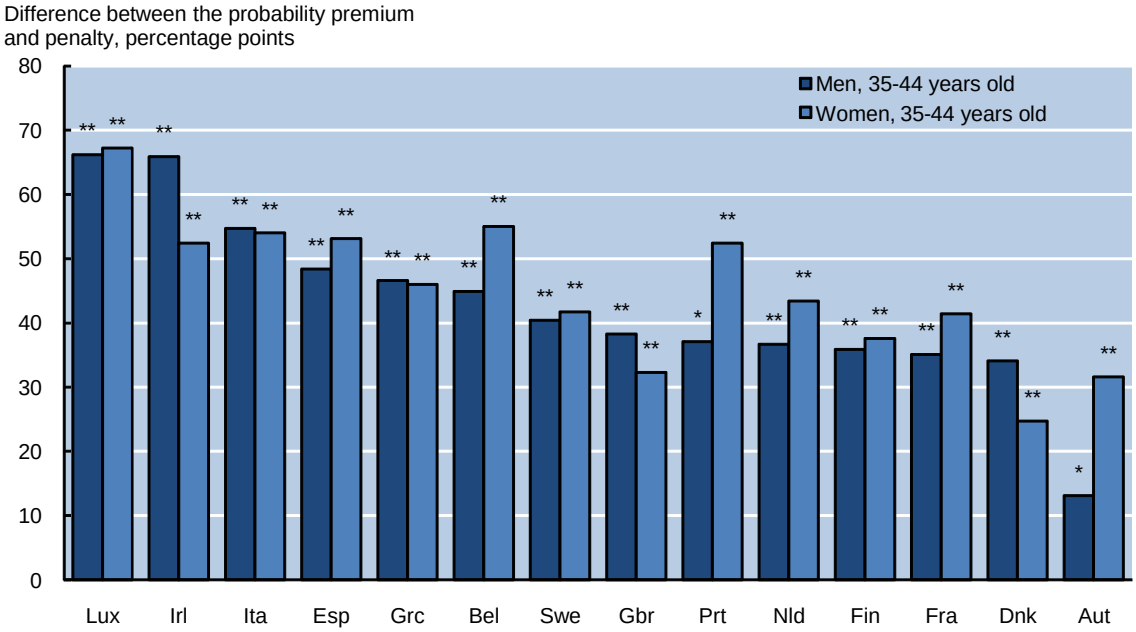
1. The figure shows the estimated percentage points change in the probability of an offspring to achieve tertiary education depending on the offspring's parental background. The probability premium is the increase in the probability of an offspring to achieve tertiary education given that his/her father had achieved tertiary education relative to an offspring whose father had upper-secondary education. The probability penalty is the decrease in the probability of an offspring to achieve tertiary education given that his/her father had achieved below upper-secondary education relative to an offspring whose father had upper-secondary education.

* denotes statistically significant at 10 % at least.
** denotes statistically significant at 5 % at least.

Based on ordered probit estimation of individuals' educational attainment, conditional on urbanisation of the living area, migration status, marital status, number of siblings and family status when the individual was a teenager. Marginal fixed effects reported.

Germany is not included in this figure, as there is a problem with the representativeness of the German sample along the education dimension.
Source: OECD calculations based on the 2005 EU-SILC Database.

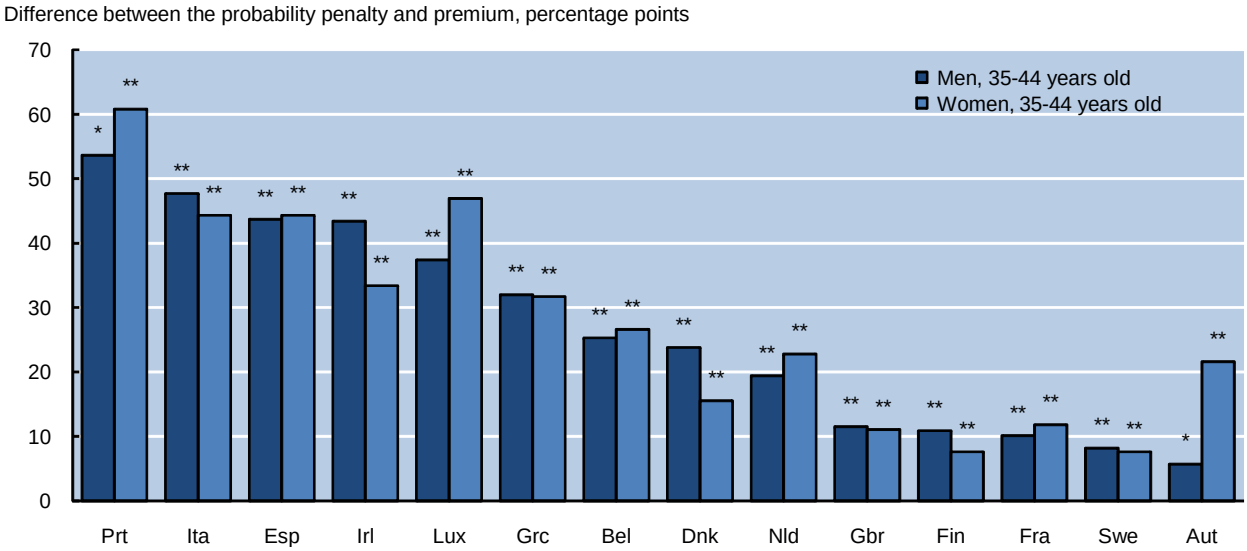
Figure 11. **Summary measure of persistence in tertiary education[1]: Selected European OECD countries**



1. Persistence in tertiary education is measured as the distance between the estimated probability premium and penalty. Thus, it measures the percentage point increase in the probability of an offspring having a father with tertiary education to achieve tertiary education relative to an offspring having a father with below-upper secondary education. A larger number implies a larger gap, thus stronger persistence in tertiary education or a higher degree of educational immobility across generations.
Based on ordered probit estimation of individuals' educational attainment. Marginal fixed effects reported.

Germany is not included in this figure, as there is a problem with the representativeness of the German sample along the education dimension.
* denotes statistically significant at 10 % at least.
** denotes statistically significant at 5 % at least.
Source: OECD calculations based on the 2005 EU-SILC Database.

Figure 12. **Summary measure of persistence in below upper-secondary education[1]**
Selected European OECD countries



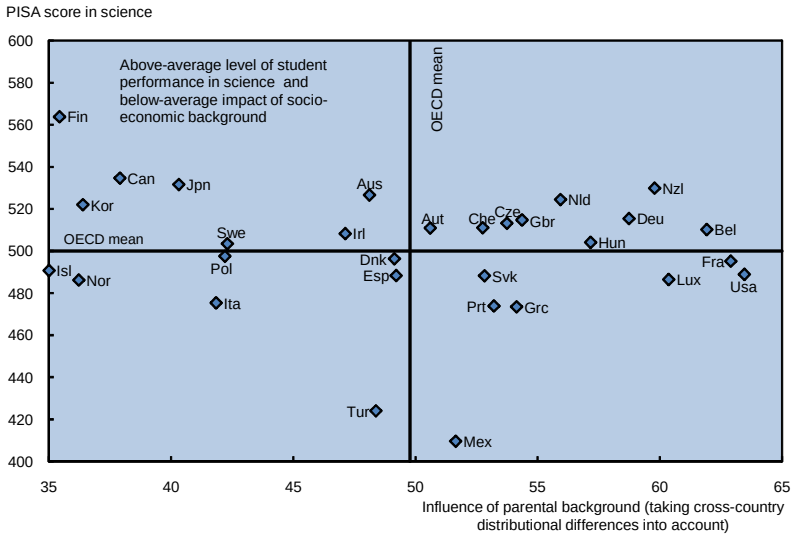
1. Persistence in below upper-secondary education is measured as the distance between the estimated probability penalty and premium. Thus, it measures the percentage increase in the probability of an offspring having a father with below upper-secondary education to achieve below upper-secondary education relative to an offspring having a father with tertiary education. A larger number implies a larger gap, thus stronger persistence in below upper-secondary education or a higher degree of immobility across generations. Based on ordered probit estimation of individuals' educational attainment. Marginal fixed effects reported.

Germany is not included in this figure as there is a problem with the representativeness of the German sample along the education dimension.

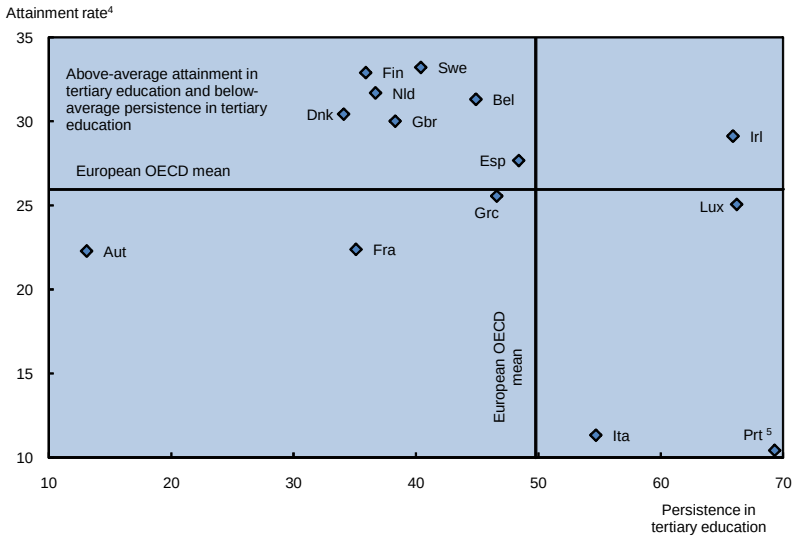
* denotes statistically significant at 10 % at least.
** denotes statistically significant at 5 % at least.
Source: OECD calculations based on the 2005 EU-SILC Database.

Figure 13. **Performance and equity in education**

A. **Secondary education** [1,2]



B. **Tertiary education**
Men, 35-44 years old[3]



1. Regression of students' science performance on students' PISA index of economic, social and cultural status (ESCS). Country-by-country least-squares regressions weighted by students' sampling probability. Robust standard errors adjusted for clustering at the school level.

2. Socio-economic gradient, taking cross-country distributional differences into account: effect of students' socio-economic background on student performance in science, defined as the difference in performance on the PISA science scale associated with the difference between the 75th and the 25th quartiles of the country-specific distribution of the student PISA index of economic, social and cultural status.

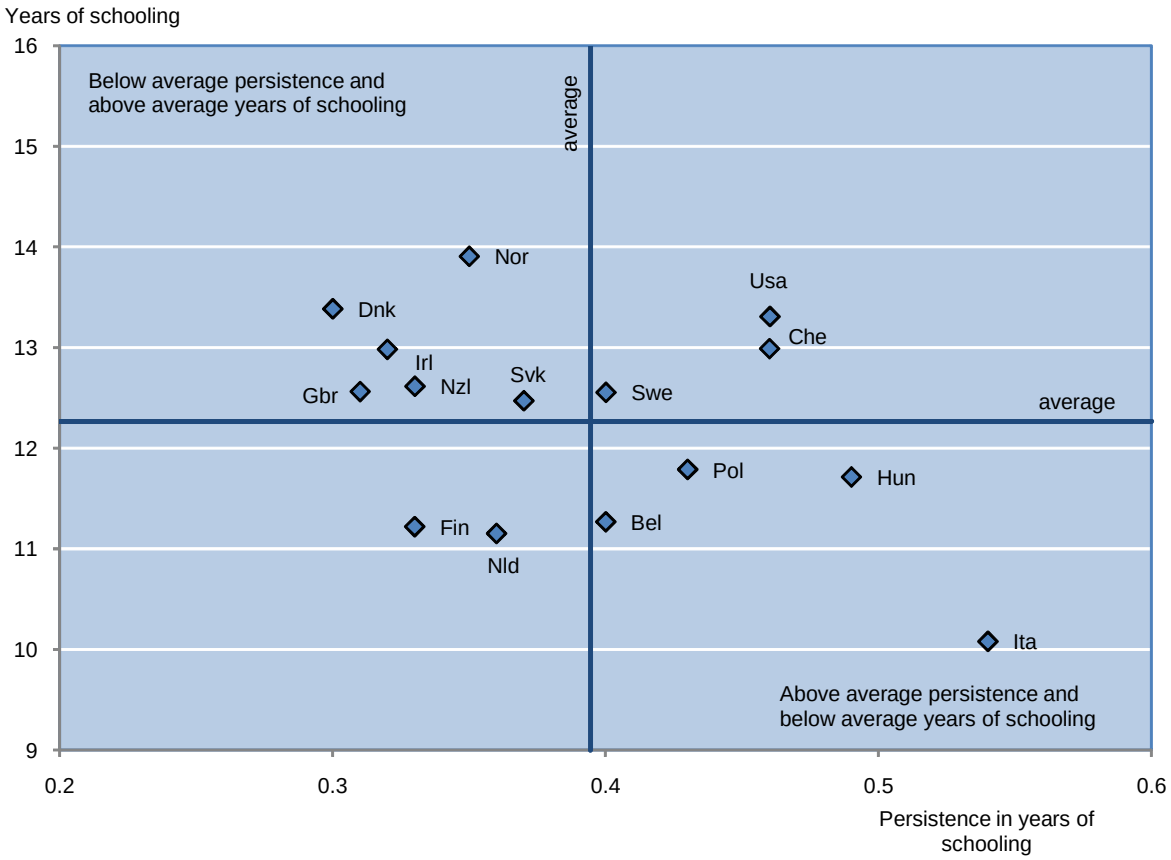
3. Persistence in tertiary education is measured as the distance between the estimated probability premium and penalty in achieving tertiary education. It measures the percentage points increase in achieving tertiary education of a child whose father had achieved tertiary education relative to a child whose father had below upper-secondary education. A larger number imply a larger gap, thus stronger persistence in education.

4. The attainment rate is defined as the percentage of 35-45 year old men in the population that has attained tertiary education according to OECD Education at a Glance Database.

5. 25-34 years old for persistence in tertiary education in Portugal.

Sources: OECD calculations based on the 2006 OECD PISA Database and on the 2005 EU-SILC Database, OECD Education at a Glance Database.

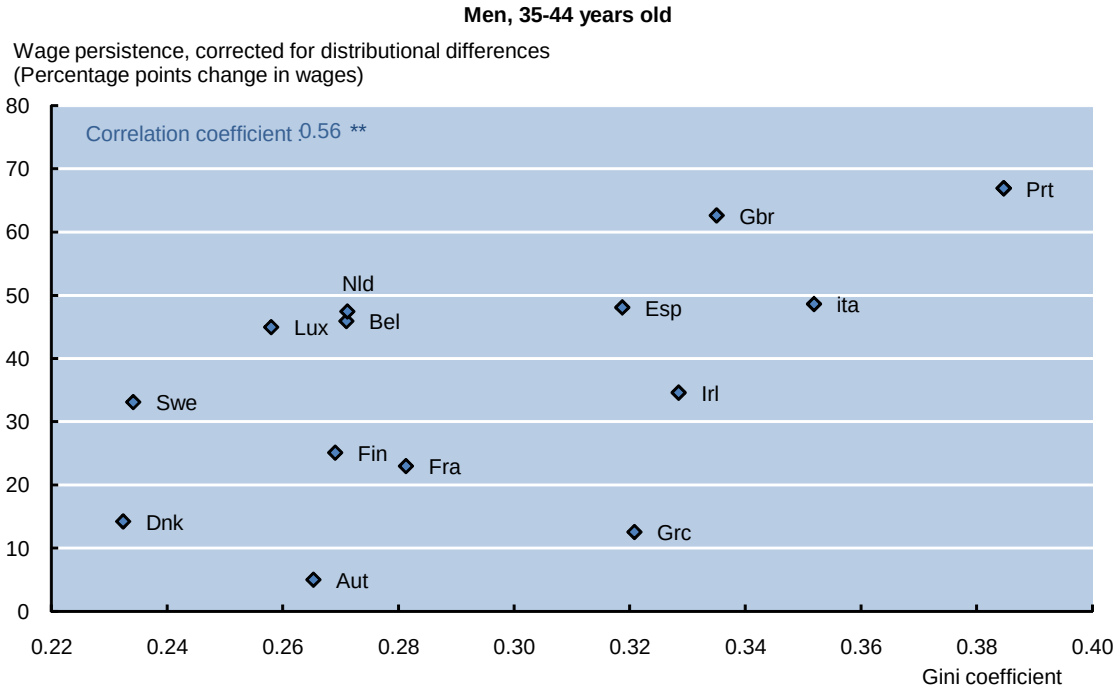
Figure 14. **Intergenerational persistence in years of schooling[1] and years of schooling**



1. Persistence refers to the correlation between parents and children's years of schooling. The correlation is the intergenerational education elasticity adjusted for the ratio of the standard deviations in years of schooling of parents and children. Data refers to men and women, age 20-69 years old.

Sources: Hertz et al. 2001 and Education at a Glance 2006.

Figure 15. **Correlation between inequality and intergenerational wage persistence (corrected for distributional differences)[1]: Selected European OECD countries**



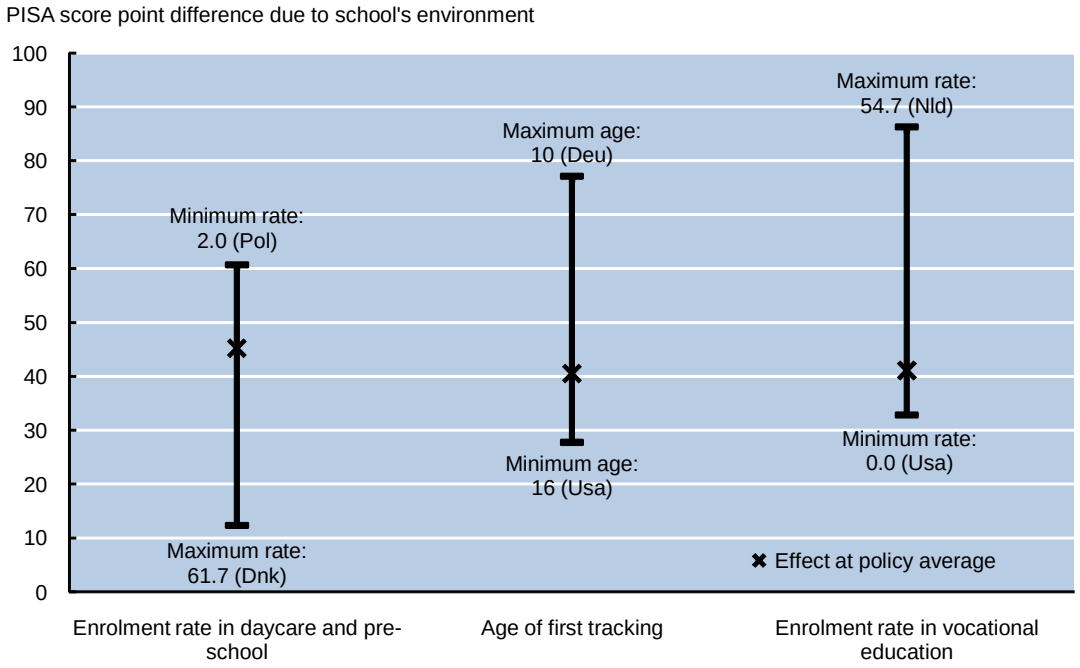
1. Persistence in wages is measured as the distance between the estimated wage premium and penalty. Thus, it measures the percentage increase in wages of an offspring having a father with tertiary education relative to an offspring having a father with below upper-secondary education. A larger number implies a larger gap, thus stronger persistence in wages or a higher degree of immobility across generations. The wage premium (penalty), corrected for distributional differences, corresponds to the wage premium (penalty), multiplied by the ratio of the standard deviation of fathers' education to the standard deviation of sons' or daughters' gross hourly wage. Inequality is measured by the Gini coefficient of disposable household income adjusted for household size.

** denotes significant at 5 %.

Germany is not included in this figure, as there is a problem with the representativeness of the German sample along the education dimension.

Sources: OECD calculations based on the 2005 EU-SILC Database and OECD 2008, Growing unequal?

Figure 16. **Effect of the school socio-economic environment on secondary education achievement under different policy settings[1, 2]: OECD countries**



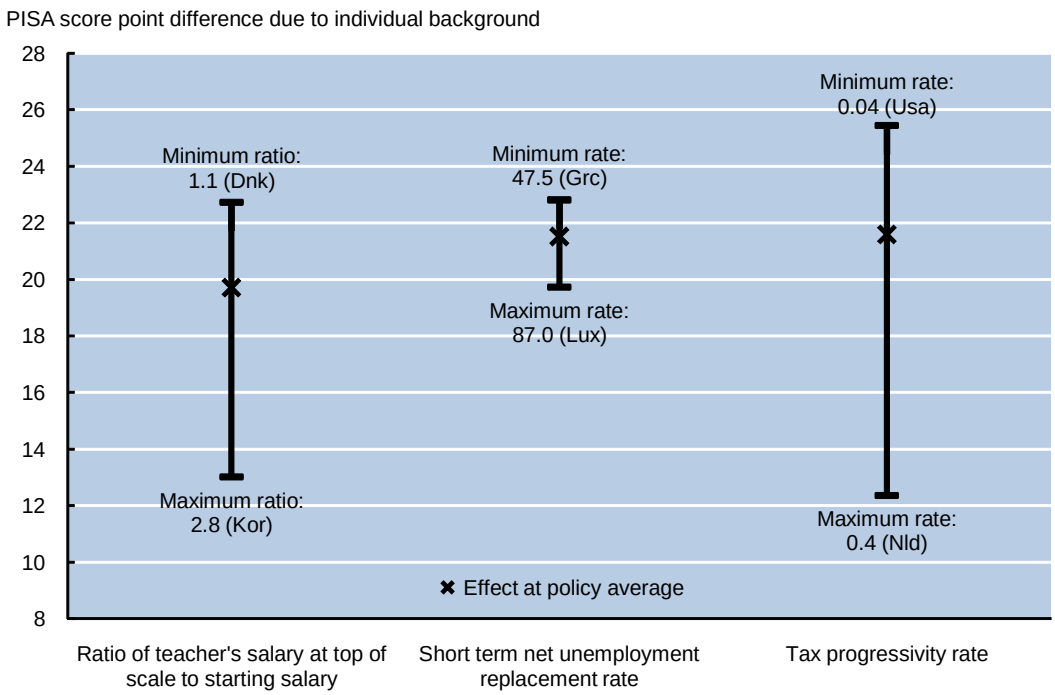
1. Each bar represents the change in the school environment effect associated with a change from the least to the most mobility-friendly level of the policy (based on OECD countries' policies distribution, excluding Mexico and Turkey).

2. Regression of students' science performance on student socio-economic background, individual control variables (gender, migration status and language spoken at home), school-level socio-economic background (average across students in the same school, excluding the individual student for whom the regression is run), school location (small town or village, city), school size and school size squared, school resources (index of quality of educational resources, index of teacher shortage, proportion of certified teachers, ratio of computers for instruction to school size), average class size, average student learning time at school and school type (private independent, private government dependent, public). Student ESCS and school-level ESCS are interacted with policy variables, entered one at a time. The regression includes country fixed effects. Country-specific parameters are used for all variables except student socio-economic background, school socio-economic background, and policy interactions.
Cross-country least-squares regressions weighted by students' sampling probability, rescaled so that each country receives an equal weight, while taking country–specific sample representativeness into account.

Based on cross-country regressions presented in Annex 2.

Source: OECD calculations based on PISA 2006 Database, various OECD and non OECD sources (see Annex 2).

Figure 17. **Effect of individual parental background on secondary education achievement under different policy settings[1, 2]: OECD countries**

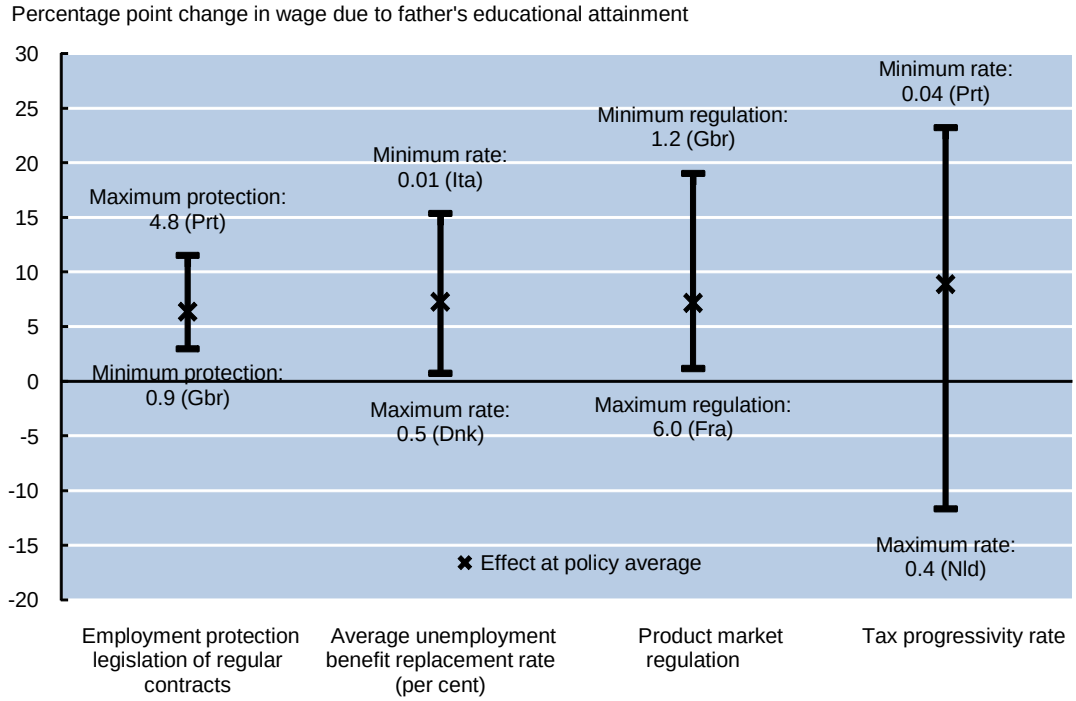


1. Each bar represents the change in the individual background effect associated with a change from the least to the most mobility-friendly level of the policy (based on OECD countries' policies distribution, excluding Mexico and Turkey).

2. Regression of students' science performance on student socio-economic background, individual control variables (gender, migration status and language spoken at home), school-level socio-economic background (average across students in the same school, excluding the individual student for whom the regression is run), school location (small town or village, city), school size and school size squared, school resources (index of quality of educational resources, index of teacher shortage, proportion of certified teachers, ratio of computers for instruction to school size), average class size, average student learning time at school and school type (private independent, private government dependent, public). The regression includes country fixed effects. Student socio-economic background (and school socio-economic background in the case of the Ratio of teachers's salary at top of scale to starting salary) are interacted with policy variables, entered one at a time. Country-specific parameters are used for all variables except student socio-economic background, school socio-economic background (in the case of the ratio of teachers's salary at top of scale to starting salary) and policy interactions.
Cross-country least-squares regressions weighted by students' sampling probability, rescaled so that each country receives an equal weight, while taking country–specific sample representativeness into account.

Based on cross-country regressions presented in Annex 2.
Source: OECD calculations based on PISA 2006 Database, various OECD and non OECD sources (see Annex 2).

Figure 18. **Effect of father's educational attainment on his son's wage under different policy settings [1,2]: Selected Europen OECD countries**



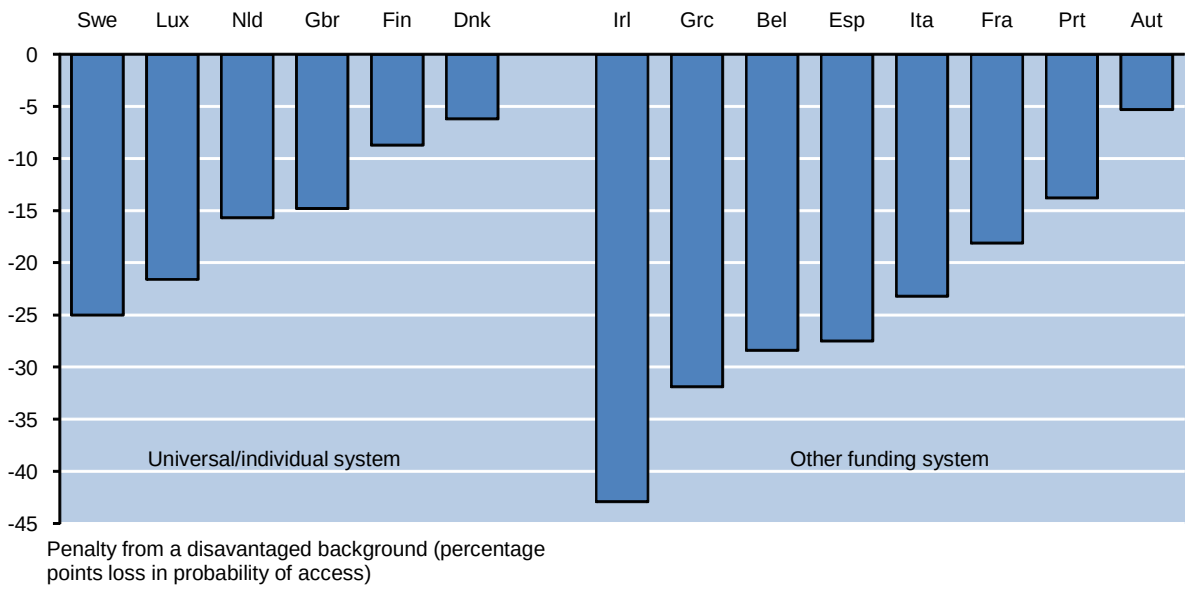
1. Each bar represents the change in the parental background effect (father's level of education) associated with a change from the least to the most mobility-friendly level of the policy (based on the European OECD countries' policies distribution).

2. Regression of men's hourly wages on father's level of education, own level of education, individual control variables (urbanisation of the area of residence, marital status, and migration background). The regression includes country-cohort fixed effects. The father's level of education is interacted with policy variables, entered one at a time. Country-cohort specific parameters are used for all variables except for father's level of education and policy interactions.
Cross-country least-squares regressions weighted by individual sampling probability, rescaled so that each country receives an equal weight, while taking country-specific sample representativeness into account.
Based on cross-country regressions presented in Annex 3.

Sources: OECD calculations based on the 2005 EU-SILC Database, various OECD and non-OECD sources (see Annex 3).

Figure 19. **Funding system and access to tertiary education[1]: Selected European OECD countries**

Men, 35-44 years old



1. The figure shows the estimated percentage points decrease in the probability of a son to achieve tertiary education given that the son's father had achieved below upper-secondary education relative to a son whose father had upper-secondary education.

Germany is not included in this figure as there is a problem with the representativeness of the German sample along the education dimension.

Sources: OECD calculations based on the 2005 EU-SILC Database, Oliveira *et al.* 2007.

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