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ABSTRACT: This paper provides evidence on the sources of differences in inequalities in educational scores in European Union member states, by decomposing them into their determining factors. Using PISA data from the 2000 and 2006 waves, the paper shows that inequalities emerge in all countries and in both period, but decreased in Germany, whilst they increased in France and Italy. Decomposition shows that educational inequalities do not only reflect background related inequality, but especially schools' characteristics. The findings allow policy makers to target areas that may make a contribution in reducing educational inequalities.

JEL Codes: I2, I38

Keywords: Education expenditures, educational inequalities, Oaxaca decomposition

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1. Introduction

Income inequality is an important but incomplete measure of inequalities and differences characterising individuals in a society, since it goes very often together with inequality in other important aspects of human life, such as education, health, housing, and political participation. However, if research on income inequality has a long tradition (e.g., Lambert, 1993), economic literature has shown only recently a growing interest in other aspects of economic well-being. A burgeoning field is the measurement of health inequalities and the decomposition of their causes (e.g., Van Doorslaer and Koolman 2004, Van Doorslaer et al., 2004, Lua J., 2007, Chen at al., 2007). In particular, following the methodology proposed by Wagstaff et al. (2003), many studies focused on the decomposition of the causes of income related health inequalities within and across countries. On the contrary, economic research on educational inequality is quite modest, even though differences in educational attainment are considered an important determinant of aggregate wage inequality. An almost unique example is provided by Sahn and Younger (2007). They decompose within and between countries inequality using TIMSS data and find that, similarly to result on health inequality, within countries inequality is greater than the between component.

While economists almost neglected the importance of understanding the causes of educational inequalities, sociologists extensively studied to which extent parental education, occupational status or class influence children's educational achievements and attainment across countries and over time. For instance, Shavit and Blossfeld (1993) analyze the development of inequalities in educational attainment in the 20th century, concluding that the association between family background and educational attainment has remained stable over the 20th century for all countries they analyzed except for Sweden and the Netherlands. They investigate inequalities in transition rates by parental education and parental occupational status analysing single countries studies, with different dependent and explanatory variables for each country. The finding of persistent inequality has been contested by Breen et al. (2009), who - in contrast to the collection of single country studies - try to ensure a higher degree of comparability across countries by using surveys from nine European countries collected between 1970 and 2002 on men ages 30-69. They show that there was a clear decline in educational inequality in several countries over the course of the 20th century, measured by the impact of one background characteristic only (social class) on attainment over time. Pfeffer (2008) measures inequality with mobility tables drawing on data from the 'International Adult Literacy Survey'. He finds a mostly stable strong association between parental education and the educational outcomes of their children for all nations.

This paper tries to fill the gap in the economic literature, by expanding the discussion on inequality beyond income and health to a different dimension: education. As for health, educational inequality can be assessed on different dimensions: access to education, performance at school, and wages. We concentrate here on inequalities in educational outcomes, considering PISA test scores, and different European countries. In particular, we first decompose observed inequalities into their causes, and then analyse their evolution over time. In particular - following the same methodology proposed by Wagstaff et al. (2003) – we decompose change in educational inequalities on standardised tests into shares due to changes in the means and inequalities of the determinants of educational outcomes, and changes due to the rate of return of its determinants. Our results highlights that – besides parental background – also schools' characteristics are important determinants of inequalities in achievements among students. Since schools' characteristics are measured here with fixed effects, it is then crucial – in a policy perspective – to improve our understanding of the black box of schools, in order to identify which factors contribute more to raise students' outcomes.

The remainder of the paper is structured as follows: Section 1 describes the methodology for the measurement of inequalities, for identify their causes and their evolution over time. Section 2 presents the data, while results are discussed in Section 3. A brief concluding section follows.

2. Methodology

2.1. Measuring Inequalities

Consider a measure of educational performance or educational outcome to assess the abilities of students. An educational system is characterized by inequalities in education if students with different socioeconomic status (SES) are characterized by different outcomes (*y*). The measurement of these inequalities is generally based on concentration indices. Let us consider the distribution of the educational outcome measures by SES. The concentration curve, labeled L in Fig. 1, plots the cumulative proportion of the population, ranked by living standards, beginning with the most disadvantaged person and ending with the richest (x-axis), against the cumulative proportion of educational attainments (y-axis). If L overlaps the 45°-line, everyone enjoys the same educational performance irrespective of her living standards. Hence, the 45°-line can be labelled as the “line of equality”. On the contrary, if L lies below the 45°-line, inequalities in educational performance exist and favour the richer members of society. The further L lies from the diagonal, the greater the degree of inequality in educational performance across the income distribution.

[Figure 1 here]

The concentration index, denoted by C, is defined as the ratio between the area amid L and the diagonal, and the area between the 45°-line. Since we are considering the proportion of individuals, and the proportion of outcomes, it can be easily shown that C simplifies to twice the area between L and the diagonal. More formally, C can be expressed as follows:

$$C = \frac{2}{N\mu}\sum_{i=1}^{N} R_i - 1 \qquad (1)$$

where μ is the mean of educational performance, N is the number of individuals, and R_i is the fractional rank of the *i*th individual in the living standard distribution.

In the case where there is no income-related inequality, the concentration curve overlaps with the equality line, and the concentration index takes a value of zero. If the educational measure is a “good” – like school attainment or achievement – inequalities to the disadvantage of the poor push C above zero and the concentration curve below the equality line. More precisely, if there are inequalities in the distribution of educational attainment, the concentration curve lies below (above) the equality line, and the concentration index takes a positive (negative) value.

2.2. Decomposing inequalities and their evolution over time

To decompose the computed degree of inequality into the contributions of different explanatory factors, we consider here the methodology proposed by Wagstaff et al. (2003). In this case, one needs first to specify a linear additive regression model for educational performance on a set of *k* determinants (x_k):

$$y_i = \alpha + \sum_k \beta_k x_{ki} + \varepsilon_i \qquad (2)$$

where α and β's are coefficients to be estimated, and ε_i is a standard random disturbance term. It is then possible to decompose the concentration index of *y* by using the means and the concentration indices of the explanatory variables. In particular, from the previous equation the relationship between these indices can be written as:

$$C = \sum (\beta \bar{x}_k / \mu) C_k + G_\varepsilon / \mu \qquad (3)$$

where μ is the mean of *y*, $\bar{x}_k$ is the sample mean of x_k, C_k is the concentration index for x_k, and G_ε is a generalized CI for ε_i defined as $G_\varepsilon = \frac{2}{n}\sum_{i=1}^{n} \varepsilon_i R_i$. In words, the concentration index C is equal to the sum of the concentration indices of the k regressors, weighted by the elasticity of y with respect to x_k (evaluated at the sample mean). The residual component reflects the inequality in educational outcomes that is not explained by systematic variation across income groups in the determinants of outcomes x_k.

Inequalities can be also considered in their evolution over time. In this case, once decomposition of inequality in its observable components has been carried out in two different time periods (*t-1* and *t*), it is interesting to decompose the observed differences over time in inequality in variations due to (i) the determinants of educational performance, and (ii) the impact of these determinants on performance. The approach proposed by Wagstaff et al. (2003) consists in applying an Oaxaca-type decomposition to the expression of the concentration index C (Eq. 3). If we denote by $\eta_k = \frac{\beta_k \bar{x}_k}{\mu}$ the elasticity of y with respect to x_k at time t, and apply the Oaxaca's method, we obtain:

$$\Delta C = C_t - C_{t-1} = \sum_k \eta_{kt}(C_{kt} - C_{kt-1}) + \sum_k C_{kt-1}(\eta_{kt} - \eta_{kt-1}) + \Delta(GC_{\varepsilon t} / \mu) \qquad (4)$$

which can be alternatively rewritten as:

$$\Delta C = \sum_k \eta_{kt-1}(C_{kt} - C_{kt-1}) + \sum_k C_{kt}(\eta_{kt} - \eta_{kt-1}) + \Delta(GC_{\varepsilon t} / \mu) \qquad \text{(4 bis)}$$

The approach allows identifying for each x_k the extent to which changes in educational inequalities are due to changes in inequalities in the determinants of educational performance (the first term on the right-hand side of each equation), rather then in their elasticities (the second term on the right-hand side).

3. Data

To assess educational inequalities and their causes, we need a measure of educational outcomes and a set of determinants of these educational outcomes. We consider here information provided by the Program for International Student Assessment, a study conducted by OECD every three years since 2000 in order to obtain an internationally comparable database on the competencies of 15 year-old students in reading, math, science and problem solving across countries. This is a widely used dataset for the analysis of educational performance. In particular, data used in this paper originate from two waves, 2000 and 2006. PISA's target population were the 15-year-old students in each country. The students had to be enrolled in an educational institution, regardless of the grade level or type of institution. Target population was tested in each country. Most PISA countries employed a two-stage sampling technique. The first stage drew a (usually stratified) random sample of schools in which 15-year-old students were enrolled, yielding a minimum sample of 150 schools per country. The second stage randomly sampled 35 of the 15-year-old students in each of these schools, with each 15-year-old student in a school having equal selection probability. The survey is not structured as a panel; rather schools are randomly selected at every round. Since the schools selected are a representative sample of the school population, we argue that not having the same sample of schools in the two surveys is not a main issue for the analysis of the evolution of inequalities over time.

The relevant notion of competencies assessed in PISA concerns knowledge and skills that can be applied in real world issues. In addition to the performance tests, students as well as schools' teacher heads answered respective questionnaires, yielding rich background information on students' individual characteristics and family backgrounds, as well as on schools' resources endowment and educational practices.

Unfortunately, some questions, and the scale used to measure some variables, change from one survey to the other reducing the number of explanatory variables that can be used by pooling the two surveys; this is especially true at the school level. For this reason, school level variables are accounted for by school fixed effects in the following analysis. The two surveys are merged using only variables included in both samples and measured with the same scale.

Our measure for educational performance is the score obtained in the reading test. The measure for the socioeconomic status (the ranking variable) is the sum of the father and mother socioeconomic index of occupational status. Absent information on income at family level not collected by Pisa, the index captures the attributes of occupations that convert parents' education into income.[*] Taking the sum rather than one parental indicator allows us to reduce problems involved with repetitive values of the indicator of economic welfare (Chen and Roy, 2008).

The explanatory variables included in the analysis are: students' gender, considering a dummy variable for females; students' background, considering a set of dummies for the highest level of education completed by both parents available at three levels: recognised third level education (ISCED 5–7), second stage of secondary level of

[*] The index was derived using an optimal scaling procedure that assigns scores to each of 271 distinct occupation categories in such a way as to maximize the indirect effect of education on income through occupation and to minimize the direct effect of education on income, net of occupation (both effects being net of age). See Ganzeboom et al. (1992) for further details on this methodology.

education (ISCED 3) and less than second stage of secondary education (ISCED 0–2), treated as the omitted category; a dummy variable for not speaking the national language at home; a dummy for being born in another country; the grade at which the student is enrolled; and, finally, school fixed effects. Whilst the first set of variables captures characteristics at the individual and family level, school fixed effects capture characteristics at the school level.

4. Results

4.1. The evolution of inequalities

Table 1 presents the concentration indices of the PISA reading test score by years and the difference over time for the following member states of the EU: France, Germany, Greece, Italy, Portugal, Spain and the United Kingdom; we also include Norway, as a Nordic country. Students have been ranked by the sum of paternal and maternal socioeconomic index of occupational status, our measure of SES. The value of the concentration index is always positive, meaning that - as the measure is attainment - high scores are concentrated amongst the better off. The closest the values are to zero the less concentration in the distribution of read score is observed. Italy, Spain and Sweden present the lowest concentration of inequalities; Portugal and Greece the highest. A positive value of the difference over time means that concentration has increased and inequality rose, whilst the contrary holds when the value of the difference is negative. Germany displayed the highest reduction in inequalities, followed by Spain and Sweden. In France, Italy, Greece and Norway inequalities increased.[†]

In what follows, we concentrate on the cases of Germany, France and Italy as they display the greatest change in inequality over the period under consideration. Figure 2 presents the difference between the concentration curve and the equality line plotted against the cumulative percentage of the sample, ranked by the sum of paternal and

[†] To check the robustness of our results, we computed the concentration index ranking individuals by the sum of maternal and paternal educational level. Differences over time display the same variation in France, Germany, Italy, Spain and Sweden; whilst results slightly change for the other countries. However, the educational level has only six categories, whilst the socioeconomic index of occupational status has 271 categories, allowing for a lower number of repetitive values in the ranking variable. Therefore, the concentration index computed using the socioeconomic index of occupational status seems more reliable than the one computed using parental education.

maternal socio-economic index of occupational status for Germany, France and Italy in 2000 and 2006. If the concentration curve for one period lies everywhere closer to the x-axis than the other, the first curve dominates the second and the ranking by degree of inequalities is unambiguous. Non-dominance emerges when the concentration curves cross. According to our estimates in Fig. 2, the concentration curve for Germany in 2006 dominates the concentration curve for 2000, suggesting that inequalities have been reduced over time for each individual in the i*th* ranking from 2000 to 2006. The opposite occurred in France and Italy, where the concentration curves for 2000 dominates the ones for 2006. This means that inequalities have increased over time in these two countries.

[Table 1 and Figure 2 here]

4.2. Regression results

The production function regression results are presented in Table 2. The hypotheses of no school fixed effects are rejected based on the F-statistics for each country and both years. We test time invariant slope coefficients based on zero slope effects from regression on pooled sample which includes observation from the 2000 and the 2006 surveys. The joint hypothesis of time-invariant slope coefficient is rejected at the 1% level for all the three countries. The mean of the school fixed effects increases considerably between 2000 and 2006 in Germany, whilst it decreases in France and Italy. Girls get lower reading scores than boys, and the gender gap widened over the period 2000-2006 in Germany and Italy, whilst it slightly narrowed in France. The estimated coefficients of maternal secondary and tertiary educational level (the omitted category is primary educational level) are positive across all countries in 2000 (though not significant for Italy), which suggest that higher maternal education is associated with higher reading test scores. However, the absolute values of the estimated coefficients have declined over time, and are not significant in France in 2006. The coefficients of paternal educational level are not highly significant in Germany and France in 2000, offsetting the lower impact of maternal education, whilst they are positive and significant in Italy. Paternal education becomes positive and significant in Germany over time, whilst coefficients decline in France and Italy. Speaking at home a non national language has always a negative and significant effect on reading score, but whilst the gap falls in Germany and France, becoming not significant in France, it slightly rises in Italy. The coefficient estimates for the immigrant dummy variable are all significant and negative for all countries and years (although almost zero and not significant in Italy in 2000), which suggests that immigrants children achieved lower educational scores status. The declining pattern of the coefficient over time observed in Germany and France may reflect the increasing integration of immigrants in the school system, whilst the opposite is observed in Italy, where the gap significantly widened over the period under consideration. Being enrolled in higher grades is always associated with higher reading scores, with the effect increasing over time in France and Italy, and slightly decreasing in Germany.

The results of the production function are qualitatively coherent with the existing burgeoning literature on PISA scores, although specifications usually differ from the one we adopt here with respect to the use of school level explanatory variables instead of school fixed effects. The impact of parental education on school performance has a steeper coefficient in Germany, whilst a flatter one in France and Italy, coherently with the findings in Baumert et al. (2003), Stanat (2003) and Entorf and Minoiu (2004). Similarly, the gap of students born in other countries when compared to the group of natives, and the gap between students with the national language as their major language spoken at home and students from foreign language speaking backgrounds is higher in Germany than in France and Italy (e.g., Entorf and Minoiu, 2004 and Ammermuelle, 2007).

[Table 2 here]

4.3. Decomposition results

Table 3, 4 and 5 present the decomposition for the two years and each country. The first two columns of the tables show the coefficients of the production function estimates as presented in Table 2. The third and fourth columns show the mean of the dependent variables for 2000 and 2006; the fifth and sixth columns present the elasticties $\eta_{ki} = \frac{\beta_k \bar{x}_k}{\mu}$, whilst the last two columns indicate the values of the concentration indices of the explanatory variables. A positive (negative) value of the concentration index suggests a pro-rich (pro-poor) distribution of the x_k determinants of inequality. As expected, in almost all countries, parental secondary education shows a pro-poor distribution, while tertiary education highlights exactly the opposite. This suggests that parental background is better amongst the better-off. Notice that Italy is somewhat an exception, since in 2006 also parental secondary education shows a pro-rich distribution. Moreover, as for parental background, the level of pro-rich inequalities is higher in Italy than in other countries.

Table 6 gives the decomposition results based on the Oaxaca decomposition, which are estimates of the contributions of explanatory variables to the concentration indices as well as the change between 2006 and 2000. Looking at the contribution of observable factors to the concentration index, being a girl has no contribution to the inequality in all three countries. Parental education disfavours the poor in the 2000 surveys, especially having a mother with tertiary education but the effect almost vanishes in the 2006 survey. The effect of being born in another country or speaking a different language is null in all countries and survey, although speaking a different language slightly disfavours poor in Italy. Being enrolled in higher grade increases inequality towards poor. The effect is stronger in France, lower in Italy and almost null in Germany.

An important source of inequality rises from school fixed effects. The effect is particularly considerable in France and Italy, and it rises over time. On the contrary, the effect is quite modest in Germany and it get to zero over time. The column headed "Change 2000-2006" shows that the reduction of inequality in Germany between 2000 and 2006 was mainly due to changes at the school level, whilst on the contrary the same variable was responsible for the increase in inequality in Italy and France.

School fixed effects clearly hide the impact of institutional differences. In Germany, the release of the PISA test results in 2001 - which indicated a mediocre academic performance of German students relative to other countries - prompted calls for reforming the educational system. Changes involved the introduction of national standards of what students are expected to know at certain grades together with a system of monitoring and evaluation; the introduction of all-day schooling, which substituted a shorter schooling day; the adoption of new pedagogical initiatives to deal with heterogeneous abilities and to foster achievements (Ertl, 2006). The activation of these measures at the school level can be responsible for the estimated reduction in educational inequalities among German students. Also in Italy, in March 2003, the Parliament approved a reform of the schools system to improve the performance of the Italian students. School fixed effects, however, are likely to veil here more cross-regional differences rather than cross-school differences. The most important innovation introduced by the law was the reduction of the age limits for compulsory education; a higher degree of differentiation at the upper secondary school level, achieved by splitting the school system into two tracks, the generalist and the vocational one; finally, a reduction of the age of access to primary school. This last change is particularly important as it anticipates the age at which students decide in which track to enrol, strengthening the parental role in the choice of the educational career. The implementation of the reform required a few years, however, among the first measures undertaken, there is a substantial reduction of school hours at the secondary school level, probably justified by the preoccupation of cutting the cost associated with the provision of public education. 15-years old Italian students in the 2006 survey were indeed exposed to less hours of teaching than students in the 2000 survey, before the reform was implemented.

The reform of the school system in France was defined by the Fillon Law, approved in 2005, which introduced a core knowledge for certain subjects. This includes French, mathematics, a foreign language, humanistic and scientific culture, communication and information; arts subjects are instead excluded. This requirement would be an educational minimum that all pupils would be supposed to receive. The main opposition to the law argued that it would have planned a two-tier education in which the majority will receive the basic minimum, while a quality education will be the preserve of the elite.

What the decomposition in Table 6 does not enable us to see is how far these changes are due to changes in elasticities rather than changes in inequalities. The Oaxaca decomposition in Table 7 answers to this question. For a given observable variable, the columns with header "$\Delta C \times \eta$" are the contributions of the respective explanatory variable to the change in inequality in the total concentration index due to the change of the concentration index of the explanatory variable itself, and the columns with header "$\Delta \eta \times C$" indicate the contribution due to the change in elasticity of the explanatory variable. The column "Total" corresponds to the sum of the two components and coincides with the column headed "Change" in Table 6. Finally the "%" column computes the relative contribution of each observable variable to the total concentration. Results first suggest the existence of different patterns for the three countries. In Germany, changes in C (the inequalities in the determinants) accounts for the observed overall decline in inequalities, with elasticities that slightly increase during the period. On the contrary, in France and Italy, the observed increase in educational inequalities is due to an increase in C less than compensated by a reduction in the elasticities η. In France, the two effects are almost of the same magnitude and opposite direction, although a slightly worsening in inequalities makes the effect of the inequalities in the covariates prevailing. In Italy, the increase in C is almost double the reduction estimated for η. Second, in all countries, the contribution of school fixed effects to ΔC is the greatest among the covariates. But, again, the sign is different: in Germany, inequalities between schools decreased (most probably as an effect of the reform implemented); in Italy and France, we observe an opposite evolution over time. Third, the negative impact on inequalities of an increase in ΔC for school fixed effects is counterbalanced in France by a reduction, similar in magnitude, in the elasticities of school fixed effects, which take the lions' share also in $\Delta \eta$. Hence, overall results for France are explained by an increase in between-schools inequalities less than compensated by a reduction in the importance of schools in the educational process; the mean of school fixed effects is actually negative in France in 2006. Fourth, in Germany and in Italy, school fixed effects are not the single most important factor in contributing to explain change in elasticities; also parental education matters. As for school fixed effects, differences in sign emerge between Germany (which experienced an increase) and Italy (which experienced a decrease) for the change in elasticities. As for parental education, in Germany the role of mother tertiary education and father secondary education decreased, whilst the role of mother secondary education and father tertiary education increased. In Italy, we observe a significant reduction in the elasticity of father tertiary education. It is difficult to find explanations for the observed patterns.

5. Conclusions

This paper analyse educational inequalities by considering PISA test scores. We focus on a number of different European countries (France, Germany, Italy, Greece, Norway, Portugal, Spain, Sweden, and UK) and measure inequalities in 2000 and 2006. Our results suggest that inequalities have been reducing only in Germany and Spain, while they increase in all remaining countries. We then concentrate on France, Germany and Italy, and decompose observed inequalities into their causes, and analyse their evolution over time. In particular - following the same methodology proposed by Wagstaff et al. (2003) – we decompose change in educational inequalities on standardised tests into shares due to changes in the means and inequalities of the determinants of educational outcomes, and changes due to the rate of return of its determinants. Our results highlights that – besides parental background – also schools' characteristics are important determinants of inequalities in achievements among students. Decomposition allows policy makers to target areas that may make the largest contribution to reducing educational inequalities. As schools are treated in this exercise as fixed effects, it is crucial in a policy perspective to open the black box of schools, in order to understand what the most important determinants of inequalities between schools are. This is left for future research.

Figure 1. Concentration Curve

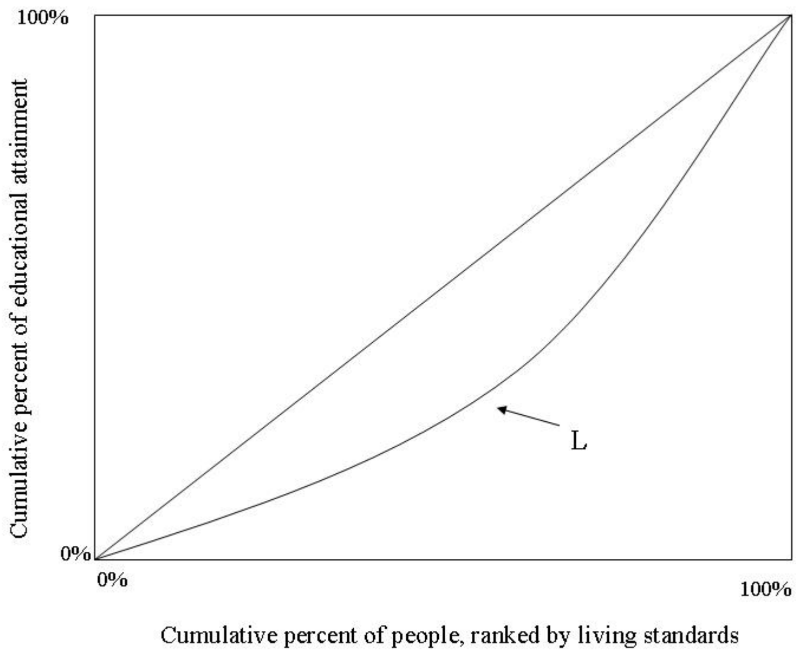

Figure 2. Difference between the concentration curve and the equality line for the reading score, 2000 and 2006

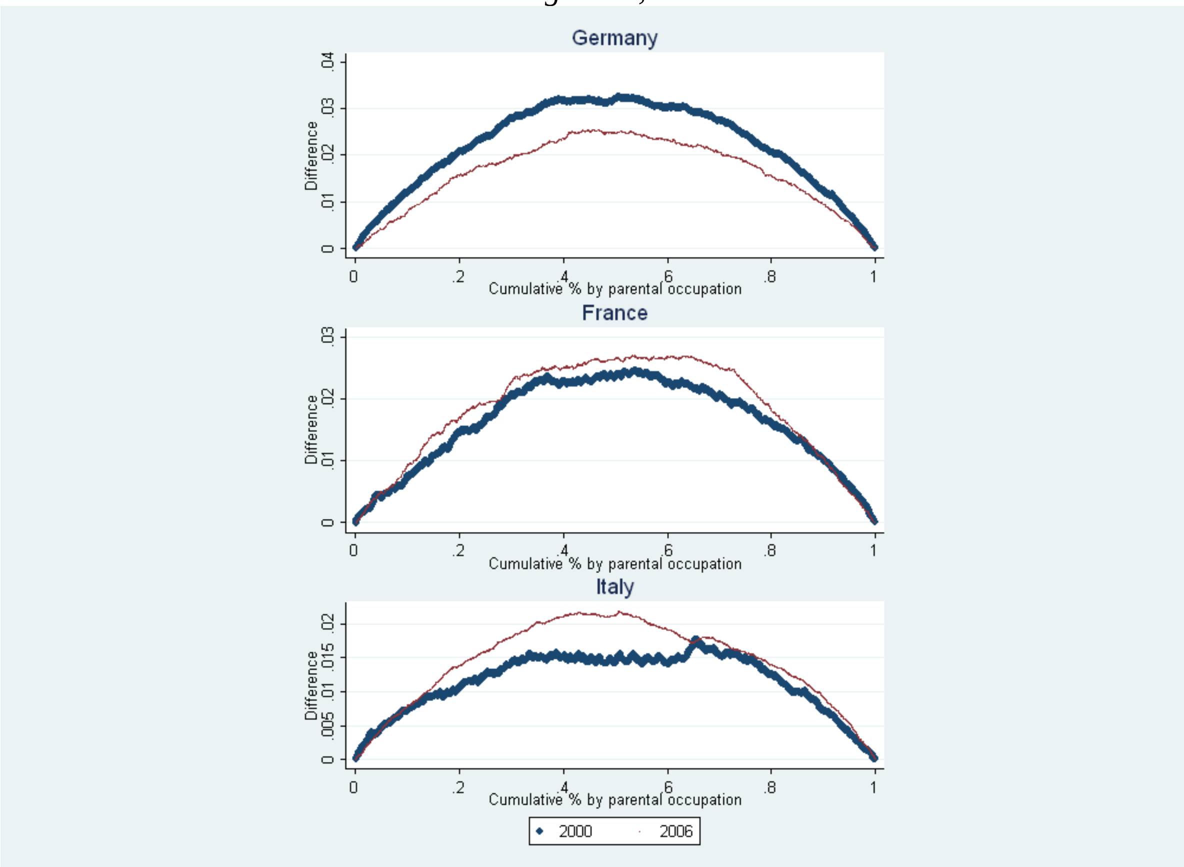

Table 1. Concentration index, 2000 and 2006 (std. dev. in brackets)

	2006	2000	Difference
France	0.0380	0.0327	**0.0053**
	[0.0018]	[0.0016]	
Germany	0.0348	0.0472	**-0.0124**
	[0.0020]	[0.0023]	
Italy	0.0288	0.0233	**0.0055**
	[0.0016]	[0.0019]	
Greece	0.0444	0.0390	**0.0054**
	[0.0022]	[0.0024]	
Norway	0.0359	0.0311	**0.0048**
	[0.0018]	[0.0019]	
Portugal	0.0442	0.0438	**0.0005**
	[0.0023]	[0.0020]	
Spain	0.0289	0.0332	**-0.0043**
	[0.0017]	[0.0016]	
Sweden	0.0330	0.0303	**0.0026**
	[0.0018]	[0.0016]	
Great Britain	0.0376	0.0374	**0.0002**
	[0.0015]	[0.0016]	

Table 2. Production function (dependent variable: read score)

	Germany		France		Italy	
	2000	*2006*	*2000*	*2006*	*2000*	*2006*
Female	-15.998	-27.904	-16.156	-15.341	-15.422	-18.652
	[2.157]**	[2.100]**	[2.037]**	[2.199]**	[2.238]**	[1.911]**
Mother second educ	35.744	17.171	10.244	3.409	5.401	4.48
	[10.847]**	[3.426]**	[4.423]*	[3.098]	[3.213]	[1.962]*
Mother tertiary educ	47.695	21.447	14.464	-1.318	5.52	2.166
	[11.154]**	[3.757**	[4.646]**	[3.635]	[3.512]	[2.923]
Father second educ	-18.563	10.144	5.726	0.357	8.248	0.784
	[9.423]*	[3.466]**	[4.026]	[2.935]	[3.342]*	[1.942]
Father tertiary educ	-18.915	5.251	6.516	2.235	8.534	-4.298
	[10.003]	[3.552]	[4.199]	[3.455]	[3.710]*	[2.930]
Not national language spoken at home	-26.954	-12.339	-13.667	-1.41	-7.427	-10.36
	(7.640)**	(4.813)*	[4.944]**	[6.088]	[3.072]*	[2.591]**
Born in another country	-24.568	-14.161	-8.784	-5.303	0.892	-7.023
	[3.577]**	[3.165]**	[2.547]**	[2.840]	[4.214]	[2.948]*
Grade	37.884	31.611	48.144	55.791	35.098	38.657
	[1.826]**	[1.753]**	[2.866]**	[3.626]**	[2.456]**	[2.349]**
School fixed effects	149.681	217.403	44.758	-30.127	140.105	101.171
	[18.248]**	[16.352]**	[27.73]	[35.024]	[24.504]**	[23.257]**
Observations	4161.000	3907.000	4135	3816	4749	20581
R-squared	0.650	0.690	0.57	0.62	0.56	0.56
F school fixed effects=0	17.536	22.151	6.382	13.453	21.527	22.216
Degree of freedom for fixed effect=0	3935	3682	3950	3649	4570	19775
p for f-test for school fixed effects=0	0.000	0.000	0.000	0.000	0.000	0.000
F test: No change in slope coefficients	651.31		2.95		5.75	
Prob > F	0.000		0.003		0.000	

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%. Test is based on common fixed effects obtained from regressions on pooled sample

Table 3. Germany - Inequality Decomposition for 2000 and 2006

	Coefficients		*Mean*		*Elasticities*		*Concentration indices*	
	2000	2006	2000	2006	2000	2006	2000	2006
Mean read score			483.988	500.086				
Female	-15.998	-27.904	0.498	0.517	-0.016	-0.029	0.029	0.044
Mother second educ	35.744	17.171	0.650	0.538	0.048	0.018	-0.086	-0.058
Mother tertiary educ	47.695	21.447	0.302	0.287	0.030	0.012	0.160	0.108
Father second educ	-18.563	10.144	0.524	0.422	-0.020	0.009	-0.147	-0.079
Father tertiary educ	-18.915	5.251	0.445	0.406	-0.017	0.004	0.171	0.103
Not national language spoken at home	-26.954	-12.339	0.072	0.064	-0.004	-0.002	0.025	-0.008
Born in another country	-24.568	-14.161	0.210	0.165	-0.011	-0.005	-0.013	-0.042
Grade	37.884	31.611	9.064	9.164	0.709	0.579	0.000	-0.001
School fixed effects	149.681	217.403	158.184	221.297	0.327	0.457	0.018	-0.001

Table 4. France - Inequality Decomposition for 2000 and 2006

	Coefficients		*Mean*		*Elasticities*		*Concentration indices*	
	2000	2006	2000	2006	2000	2006	2000	2006
Mean read score			504.3838	491.1547				
Female	-16.156	-15.341	0.484	0.487	-0.015	-0.015	0.014	0.018
Mother second educ	10.244	3.409	0.446	0.482	0.009	0.004	-0.222	-0.084
Mother tertiary educ	14.464	-1.318	0.474	0.308	0.014	-0.001	0.258	0.339
Father second educ	5.726	0.357	0.457	0.449	0.005	0.000	-0.219	-0.123
Father tertiary educ	6.516	2.235	0.462	0.328	0.006	0.002	0.270	0.380
Not national language spoken at home	-13.667	-1.410	0.049	0.055	-0.001	0.000	-0.093	-0.079
Born in another country	-8.784	-5.303	0.251	0.232	-0.004	-0.003	-0.020	0.053
Grade	48.144	55.791	9.510	9.586	0.908	1.088	0.012	0.011
School fixed effects	44.758	-30.127	53.897	-28.963	0.107	-0.059	0.135	-0.332

Table 5. Italy - Inequality Decomposition for 2000 and 2006

	Coefficients		*Mean*		*Elasticities*		*Concentration indices*	
	2000	2006	2000	2006	2000	2006	2000	2006
Mean read score			487.3614	470.7624				
Female	-15.422	-18.652	0.503	0.496	-0.016	-0.020	0.007	0.014
Mother second educ	5.401	4.480	0.430	0.421	0.005	0.004	-0.273	0.009
Mother tertiary educ	5.520	2.166	0.441	0.191	0.005	0.001	0.349	0.562
Father second educ	8.248	0.784	0.445	0.406	0.008	0.001	-0.262	0.008
Father tertiary educ	8.534	-4.298	0.441	0.193	0.008	-0.002	0.364	0.586
Not national language spoken at home	-7.427	-10.360	0.170	0.125	-0.003	-0.003	-0.257	-0.250
Born in another country	0.892	-7.023	0.059	0.101	0.000	-0.002	0.040	-0.113
Grade	35.098	38.657	9.862	9.846	0.710	0.809	0.005	0.006
School fixed effects	140.105	101.171	135.974	106.691	0.279	0.227	0.059	0.096

Table 6. Contribution of observables and change between 2000 and 2006

	Contribution to C						Change 2006 - 2000		
	Germany		France		Italy		Germany	France	Italy
	2000	2006	2000	2006	2000	2006			
Female	-0.0005	-0.0013	-0.0002	-0.0003	-0.0001	-0.0003	-0.0008	-0.0001	-0.0002
Mother second educ	-0.0041	-0.0011	-0.0020	-0.0003	-0.0013	0.0000	0.0031	0.0017	0.0013
Mother tertiary educ	0.0047	0.0013	0.0035	-0.0003	0.0017	0.0005	-0.0034	-0.0038	-0.0012
Father second educ	0.0030	-0.0007	-0.0011	0.0000	-0.0020	0.0000	-0.0036	0.0011	0.0020
Father tertiary educ	-0.0030	0.0004	0.0016	0.0007	0.0028	-0.0010	0.0034	-0.0009	-0.0038
Not national language spoken at home	-0.0001	0.0000	0.0001	0.0000	0.0007	0.0007	0.0001	-0.0001	0.0000
Born in another country	0.0001	0.0002	0.0001	-0.0001	0.0000	0.0002	0.0001	-0.0002	0.0002
Grade	-0.0002	-0.0008	0.0110	0.0116	0.0036	0.0045	-0.0006	0.0006	0.0008
School fixed effects	0.0058	-0.0004	0.0144	0.0196	0.0164	0.0219	-0.0062	0.0052	0.0055
"Residual"	-0.0030	-0.0067	0.0053	0.0072	0.0015	0.0023	-0.0038	0.0019	0.0008
Total	0.0028	-0.0090	0.0327	0.0380	0.0233	0.0287	-0.0118	0.0053	0.0054

Table 7. Oaxaca-type decompositions for change in inequality 2000 and 2006

	Germany				France				Italy			
	ΔC×η	Δη×C	Total	%	ΔC×η	Δη×C	Total	%	ΔC×η	Δη×C	Total	%
Female	-0.0004	-0.0004	-0.0008	9.88	-0.0001	0.0000	-0.0001	-1.69	-0.0001	0.0000	-0.0002	-3.46
Mother second educ	0.0005	0.0025	0.0031	-38.16	0.0005	0.0012	0.0017	49.76	0.0011	0.0002	0.0013	29.35
Mother tertiary educ	-0.0006	-0.0028	-0.0034	42.67	-0.0001	-0.0038	-0.0038	-112.00	0.0002	-0.0014	-0.0012	-27.48
Father second educ	0.0006	-0.0042	-0.0036	45.26	0.0000	0.0011	0.0011	32.50	0.0002	0.0018	0.0020	43.50
Father tertiary educ	-0.0003	0.0037	0.0034	-42.56	0.0002	-0.0011	-0.0009	-27.43	-0.0004	-0.0035	-0.0038	-84.61
Not national language spoken at home	0.0001	0.0001	0.0001	-1.41	0.0000	-0.0001	-0.0001	-3.21	0.0000	0.0000	0.0000	0.51
Born in another country	0.0001	-0.0001	0.0001	-0.73	-0.0002	0.0000	-0.0002	-6.42	0.0002	-0.0001	0.0002	3.65
Grade	-0.0006	0.0000	-0.0006	7.48	-0.0016	0.0022	0.0006	17.07	0.0003	0.0005	0.0008	18.45
School fixed effects	-0.0085	0.0023	-0.0062	77.57	0.0275	-0.0223	0.0052	151.42	0.0085	-0.0031	0.0055	120.09
"Residual"			-0.0038	46.81			0.0019	55.90			0.0008	18.22
Total	-0.0092	0.0012	-0.0080		0.0263	-0.0229	0.0034		0.0101	-0.0055	0.0045	

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