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Excellence through equality of opportunity – Increasing the social inclusiveness of education systems benefits disadvantaged students without harming advantaged students — Source link

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Excellence through equality of opportunity – Increasing the social inclusiveness of education systems benefits disadvantaged students without harming advantaged students

5. Excellence through equality of opportunity – Can increasing the social inclusiveness of education systems benefit disadvantaged students without harming advantaged students?[1]

Abstract

Middle- and upper-class parents tend to think that school systems in which students from different socio-economic backgrounds learn together in the same schools would promote equality of opportunity but would harm their children. I investigate this belief, making both a conceptual and a methodological contribution. Conceptually I broaden the concept of differentiation in education arguing that not only formal differentiation but also more 'hidden' forms of differentiation such as residential segregation or private schools might contribute to a segregation of students from different socio-economic backgrounds into separate schools. Methodologically I contribute to the debate by analysing changes within countries, controlling for time-constant unobserved differences between countries. Using five waves of PISA data for 35 countries from 2000 to 2012, I find that in education systems in which schools become more socially inclusive, students from disadvantaged families improve their performance. Students from better-off families perform well independent of whether the education system becomes more socially segregated or inclusive. Thus, there is no conflict between equality of opportunity and excellence in education. In contrast, excellence can be improved through equality of opportunity without hindering advantaged students or top performers.

1. Introduction

Middle- and upper-class parents often think that a school system in which students from different socio-economic backgrounds and with different ability levels learn together in the same schools would harm their children, because teachers might need to slow down instruction or because the school climate and motivation might worsen. A school system in which students from different social backgrounds and with different abilities attend separate schools, on the other hand, can create disadvantageous school environments with lower expectations, motivation, and teaching quality for low-performing or socio-economically disadvantaged students. This chapter examines whether there is such a trade-off: is an integrated school system good for both socio-economically disadvantaged and low-achieving students, whereas it hampers both socio-economically advantaged and high-achieving students? I try to answer this question by making both a conceptual and a methodological contribution to the literature on differentiation in secondary education and its consequences for educational achievement. Conceptually, I broaden the perspective on differentiation in education that often focuses only on formal external tracking. Besides tracking, there are also more 'hidden'

[1] This is a draft chapter. The final version has been published in: Blossfeld, H.-P., Buchholz, S., Skopek, J., and Triventi, M. (Eds.) (2016), Models of Secondary Education and Social Inequality – An International Comparison. Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.

forms of differentiation that contribute to segregating schools in terms of socio-economic background and ability. I argue that especially in an international comparison, it is important to take into account that there might be other mechanisms than tracking that lead to a separation of students in terms of socio-economic background and ability and enlarge inequalities in school quality. Therefore, I use the social segregation of schools – defined as the extent to which students from different social backgrounds attend separate schools – as a measure of differentiation in secondary education.

In addition to broadening the concept of differentiation, this chapter attempts to make a methodological contribution. In the literature, questions about the effects of educational differentiation are often addressed by comparing countries with early tracking to those with later tracking (Horn 2009; Le Donné 2014). This comparison is problematic if early tracking is related to unobserved characteristics. In this case, it is not clear whether students from disadvantaged families perform worse in countries with early selection because tracking creates unfavourable learning environments in lower tracks, or because disadvantaged families provide more disadvantageous learning environments than in other countries – for instance in terms of overlap with other dimensions of social inequality such as migration background, neighbourhood conditions, or single parenthood. To the extent that these unobserved country differences remain constant, I cope with this problem by analysing changes within countries over time using PISA data from five waves. When schools become more integrated by socio-economic status, how does this affect different groups of students?

The chapter is structured as follows: I explain the concept of formal and 'hidden' differentiation in secondary education, discuss why less differentiation might promote disadvantaged children without affecting advantaged students, and outline methodological problems. Afterwards, I explain the research design and present the results.

2. Formal and 'Hidden' Differentiation in Secondary Education

Whether students with varying socio-economic backgrounds and abilities are taught together in the same schools or attend different schools varies between education systems. This is due to variations in formal differentiation, on the one hand, and 'hidden' differentiation, on the other. The comparative literature on the effects of differentiation in secondary education focuses largely on formal differentiation. Formal differentiation means that students are separated into different school types or tracks/programmes at some point in their school career. The intention behind is to homogenize the student body so that teachers can tailor their instruction to fit students' needs and interests. But because performance, interests, and aspirations are influenced by families, tracking strengthens the social segregation between schools.

However, by focusing only on formal differentiation, one misses more 'hidden' forms of differentiation. Even in comprehensive education systems, middle- and upper-class parents find ways to differentiate their children from others and to ensure that they attend high-quality schools. In some countries parents are free to choose their children's school, reinforcing school segregation because school choices vary by socio-economic background. And also schools may select students. Nonetheless, even when children are required to attend the school within their district, children from varying family backgrounds attend different schools to the extent that there is residential segregation (Burgess and Briggs 2010). To sum up, formal and informal differentiation in secondary

education entail that students from varying social backgrounds and with varying abilities attend different schools. To capture both formal and hidden differentiation in education, I use the extent of schools' social segregation in a country defined as the extent to which students from varying social backgrounds attend separate schools (see section 5).

Formal differentiation is intended to separate students by ability, creating academically homogeneous groups. That means that performance variance is high between schools, but low within schools. I do not use this indicator of ability differentiation between schools, because changes in variance between schools are not independent of changes in my dependent variable, which is changes in the performance of different groups of students. However, socio-economic and ability differentiation are positively related (see appendix, Figure A1). In general, in the early-tracking countries, not only children with varying performance levels but also children from different socio-economic backgrounds attend separate schools. Therefore, indicators of both formal differentiation – such as the age at the first selection – and informal differentiation – such as the socio-economic segregation among schools – would classify these education systems as unequal (appendix, Figure A2). However, there are also countries without early selection such as the United States that are nonetheless characterized by a high socio-economic segregation among schools. Thus, even though both Finland and the United States separate students only at the age of 16, the Nordic countries have the most socially inclusive education systems, whereas the United States' education system is one of the most socially segregated. These differences cannot be captured with an indicator of formal differentiation, which is why I use the socio-economic segregation among schools as my indicator of an education system's informal differentiation.

3. Why less differentiation might boost disadvantaged students' performance without harming advantaged students

Why might an education system's socio-economic segregation matter for students' performance? The concentration of socio-economically disadvantaged students creates disadvantaged schools in terms of peers, teachers, and instruction. Peer effects might lead to a worse school climate and motivation and influence the quality of instruction. In schools with more students from disadvantaged families and seemingly lower ability, teachers tend to have lower expectations and slow down the pace of instruction. Schools with many students who are perceived to be difficult have problems attracting good teachers (Gamoran and Berends 1987). When schools are perceived to be of low quality and have problems attracting good teachers, parents with high educational aspirations will try to avoid them. This reinforces the concentration of disadvantaged students in these schools. Because differentiation in terms of socio-economic background traps students from disadvantaged families in disadvantageous schools (Oakes 1985; Gamoran and Berends 1987; Bifulco et al. 2008), I expect that students from disadvantaged families will perform worse in socially segregated education systems (Hypothesis 1).

The advocates of more differentiation fear that high-performing students and those from socio-economically advantaged families are hampered if they are taught together with students from disadvantaged families who tend to perform worse at school (Hoxby 2003). For example, most parents in Germany believe that it is better for good students to be taught together with other good students (Süßlin 2013). Taking these positions together, there might be a trade-off between the promotion of high-performing and socio-economically advantaged students on the one side, and low-performing and socio-economically disadvantaged students on the other side.

Against the view of a trade-off, however, there are arguments why students from disadvantaged families would benefit from an inclusive school system, whereas students from advantaged families would not lose: good learning opportunities at school might be especially important for students from lower socio-economic groups and migrants because they could potentially compensate for less stimulation and support in families (Coleman 1966; Alexander et al. 2001). Socio-economically advantaged students, on the other hand, might succeed anyway, either because their parents are able to compensate for a bad school, or because school quality does not deteriorate even when the student body becomes more mixed. School quality might not suffer either because advantaged parents hold teachers responsible for their teaching or because more advanced students can gain a deeper understanding while explaining something to less advanced students and thereby benefit from an enriched classroom discussion including more diverse perspectives. To sum up, children from privileged families might not be harmed by an integrated education system but will succeed anyway.

Building on these arguments, my hypothesis is that there is no trade-off between the performance of students from different social backgrounds and with different abilities: When an education system becomes more integrated by socio-economic background, socio-economically disadvantaged and low-performing students will benefit (Hypothesis 1), whereas there will be no consistent negative effect for students from socio-economically advantaged families or for high performers (Hypothesis 2). Thus, the argument is that there is no trade-off between equality of opportunity and excellence in education.

4. Literature and methodological challenges

There are two main methodological approaches to analysing the effect of differentiation on students' performance. One is to compare countries with different education systems and the second is to evaluate institutional reforms. Conceptually, both approaches focus on formal differentiation only, leaving aside more 'hidden' forms of differentiation.

Exploiting institutional differences between school systems, the comparative literature shows that in early-tracking school systems the effect of social background on students' performance in PISA is stronger than in comprehensive school systems (Horn 2009; Van de Werfhorst and Mijs 2010). This comes without an advantage in the average performance level, because students from disadvantaged families perform better in countries with a later age of selection, whereas students from advantaged families perform similarly in countries with early and late selection (Horn 2009; Van de Werfhorst and Mijs 2010; Le Donné 2014). Thus, the comparative literature finds no trade-off between equality of opportunity and excellence.

Conceptually, the comparative literature focuses on formal differentiation, using as indicators the age of the first selection in an education system and the number of different tracks available. Le Donné (2014) broadens the perspective by including the amount of selective schools and private schools with fees. Nonetheless, school differentiation due to residential segregation cannot be captured with these variables.

One methodological challenge is that educational differentiation might be interwoven with unobserved societal characteristics such as socioeconomic inequality or ethnic diversity. Therefore, achievement gaps may already be larger in early tracking countries before they separate students into different tracks. To cope with this problem, Hanushek and Woessmann (2006) use a 'difference-

in-difference' approach. They compare how inequality of outcomes develops from the end of primary school to the end of lower secondary school in countries that track students in-between these time points and in countries that do not. Using TIMSS and PIRLS data for 4th graders and PISA data for 15-year-old students, they find that early tracking increases educational inequality, because low-performing students are left behind. But they state that 'in no case do some students gain at the expense of others' (Hanushek and Woessmann 2006: 74).

The advantage of the difference-in-difference approach is that unobserved differences between countries do not influence the analysis as long as they remain constant. What is crucial in order to identify changes within countries is a comparable sample across the two points in time. Because PIRLS and TIMSS sample by grade whereas PISA samples by age, Jakubowski (2010) argues that this is not the case.

Van de Werfhorst (2013) analyses students' performance in several countries before and after de-tracking reforms and compares them to developments in countries in which no such reform took place. He finds that the education systems that became comprehensive experienced a stronger reduction in educational inequality compared to the others. However, although he tracks changes over a long period of time from 1964 to 1980, he cannot test the assumption that, without the reforms, countries that transformed their education system would have developed in the same way as countries that did not. This is a strong assumption because there are reasons why some countries moved from a tracked towards an untracked education system whereas others did not. Thus, comparative research might tend to overestimate the effect of tracking because it does not take into account unobserved differences between tracking and non-tracking countries.

Instead of exploiting the institutional variation between countries, another possibility is to analyse the effect of de-tracking education reforms within single countries. Jakubowski et al. (2010) evaluate a Polish school reform postponing tracking by one year and Kerr et al. (2013) evaluate the Finnish comprehensive school reform from the 1970s postponing selection by five years. Using the gradual implementation of the school reform, Kerr et al.'s difference-in-difference estimates reveal that sons with low-educated parents improved due to the school reform. The effect size is remarkable, corresponding to one-quarter of the effect size of parental education. Even more remarkably, the reform had no negative effects on test scores of students from families with higher education, even though the age of selection was postponed by five years.

To sum up, most studies find that de-tracking has positive effects for low-performing students and those from disadvantaged families, whereas there is no effect on students from advantaged families and high performers. Conceptually, the literature on the effects of differentiation in secondary education is restricted to formal differentiation. Methodologically, the literature might overestimate the effect of tracking when intertwined societal characteristics are not controlled. To cope with both, I analyse the relation between changes in schools' social segregation and students' performance within countries over cohorts.

5. Research design, data, and variables

5.1 Dependent Variables: Changes in Test Scores

To investigate the effects of schools' socio-economic segregation on students' performance, I use students' test scores in the PISA reading assessment as dependent variables (appendix, Table A2).

PISA assesses students' capacity to apply knowledge to real-life settings, to analyse, reason, and solve problems. The PISA studies have been carried out every three years since 2000. In each round, one of the subjects was the main assessment area, starting with reading. Therefore, test results can be compared directly over time following the year in which a subject has been the main assessment area. Hence, reading scores can be compared over all waves; mathematics, from 2003 onwards; and science, from 2006 onwards. I shall focus on reading, although results for mathematics are very similar. The mean score in the first PISA round within OECD countries is 500 and the standard deviation is 100. To be better able to interpret the scores, the OECD estimates that about 40 points on the PISA scale correspond to the learning progress made by students within one school year (OECD 2013).

To analyse the effects of changes in social segregation on high- and low-performing children, I use the percentage of a country's 'low performers' and 'top performers' (appendix, Table A2). Top performers achieve proficiency level 5 or higher, being able to understand texts about unusual topics, apply their knowledge to new situations, and formulate and reflect on their own opinion. Low performers do not achieve proficiency level 2, because they are unable to summarize the main ideas of a text (OECD 2010).

5.2 Independent Variables

To measure students' socio-economic background, I use the Economic Social and Cultural Status (ESCS) provided by the OECD (appendix, Table A3). This index is composed of three components: one for parents' highest educational attainment, one for their highest occupational prestige, and one relating to affluence and cultural goods. To make it comparable over time, the OECD provides rescaled indices of the ESCS on the 2012 scale that I have merged to every dataset. In my sample, the median ESCS corresponds to zero; the 10th percentile, to -1.3; and the 90th percentile, to 1.2.

To capture a country's socio-economic segregation among schools, I measure how much of the ESCS variance lies among schools. The estimate comes from a multilevel analysis in which the ESCS as dependent variable is clustered within schools. The intra-class correlation multiplied by 100 expresses the proportion of variance in social background explained by schools. In Finland, as the most equal school system, only about 8 per cent of the variance in ESCS lies between schools, whereas in Hungary, as the most socially segregated school system, this value amounts to 38 per cent (appendix, Table A1).

Because I want to compare the index of social segregation among schools over time, it is crucial that the definition of schools does not change. There is no common definition of schools across countries, because schools in PISA serve primarily as sampling units. For example, in Austria, the Czech Republic, Germany, Hungary, Japan, Romania, and Slovenia, study programmes within schools are treated as schools. In Italy, schools are defined as administrative units that might be located on different campuses; whereas in other countries, schools are defined by school buildings or by school principals (OECD 2013). Although the differences in definitions are a problem, this is less severe because I am using only changes within countries. The crucial aspect for the present approach is that the definition of schools *within countries* does not change over time. There is no indication of any change in the definition of schools in any of the Technical Reports. Another problem when comparing the index of social segregation over time arises from changes in the stratification variables used to sample schools. Therefore, when calculating the socio-economic segregation, I weight the data with

the final student weights at the student level and with the sum of students' weights within a school at the school level.

5.3 Research Strategy and Models

To cope with the problem that tracking might be intertwined with unobserved societal characteristics, I shall look at changes *within* countries using five waves of PISA data. Therefore, I run country-fixed-effects models with the advantage of controlling for all differences remaining constant over time. To analyse only changes *within* countries, I take each variable and subtract its respective country mean over all waves. Because the socio-economic conditions in which children grow up can also change over time within a country, I control for within-country changes in the average and the standard deviation of the ESCS.[i] [ii]

The dependent variable is changes in students' reading performance. As independent variable, I include students' ESCS and schools' social segregation at the country level. In this model, the outcome of interest is the coefficient of school segregation capturing how changes in school segregation influence changes in countries' mean performance. In Model 2, I add a cross-level interaction of social segregation with students' ESCS to capture how changes in social segregation change the influence of parental background on students' performance.

To compare the effect across students from socio-economically advantaged and disadvantaged backgrounds, I graph the marginal effects of changes in schools' social segregation on students' performance. To analyse how changes in social segregation affect high- and low-performing students, I use the percentage of high and low performers in a country as alternative dependent variables.

5.4 Sample

I restrict the analyses to OECD and EU countries, excluding the OECD outliers Chile, Mexico, and Israel. This leaves me with 35 countries. Because I merge five waves for reading and four waves for mathematics, the sample includes more than one million students for reading and more than 900 000 students for mathematics who attend more than 40 000 schools.

6. Findings

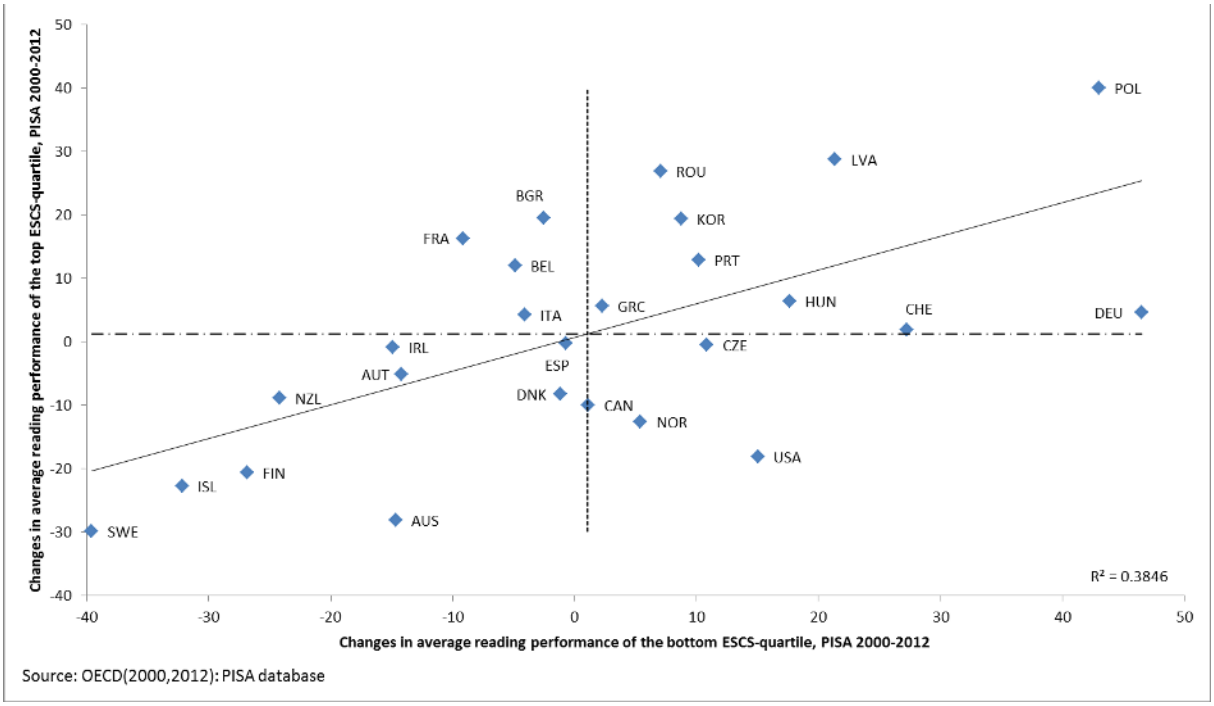
6.1 How Students' Mathematics Performance Evolved Over Cohorts

Over the 12 years between PISA 2000 and 2012, the reading performance of socio-economically disadvantaged students in the bottom quartile of the ESCS improved most in Germany, Poland, Switzerland, and Latvia. With about 40 points, the improvement in Poland and Germany corresponds to students' progress within a whole school year. Socio-economically disadvantaged students performed worse a decade after the first PISA test in Sweden, Iceland, Finland, and New Zealand.

Interestingly, in two of the countries in which students from socio-economically disadvantaged families improved most, namely Poland and Latvia, students from better-off families also improved most over cohorts. Similarly, in Sweden, where the performance of students from low-ESCS families deteriorated most, high-ESCS students also lost out. Only in the United States and France are there indications that one group lost out whereas the other gained. The positive correlation between changes in the top and the bottom quartile of the ESCS corresponds to 0.62. Thus, Figure 1 reveals that

there is no trade-off between the performance developments of students from different social backgrounds: they seem to be all in the same boat.

Figure 1: Changes in reading performance for the bottom and the top ESCS quartile, PISA 2000–12



Source: OECD(2000,2012): PISA database

6.2 How the Schools' Social Segregation Evolved Over Time

Whereas formal differentiation changed only in Poland over the period covered by PISA studies, social segregation among schools changed in several countries. Schools became less socially segregated from the first to the last cohort observed in Turkey, Poland, Japan, Spain, the Netherlands, and Switzerland, whereas they became more socially segregated in Latvia, Bulgaria, Portugal, Austria, and Romania. The changes range from a 12 percentage point reduction in Turkey to a 12 percentage point increase in Latvia (appendix, Figure A4).

6.3 How Changes in the Social Segregation of Schools Relate to Equality and Excellence

Do changes in an education system's socio-economic segregation go hand in hand with changes in equality of opportunity? And if so, is increasing equality of opportunity brought about by decreases in excellence? To answer these questions, this section applies country-fixed-effects models using changes within countries between each wave, whereas the descriptive part gave an overview over changes from the first to the last cohort observed in PISA.

When the socio-economic segregation among schools increases, so does the influence of students' family background on performance (Table 1, Model 2). This is in line with my first hypothesis arguing that, for students from disadvantaged families, a more socially segregated school system means worse learning opportunities at school in addition to worse learning opportunities in families. When compared to the main effect of ESCS, however, the effect size is quite small: a student with a one standard deviation higher ESCS than her peers performs on average 38 points higher in the PISA reading test. This corresponds to what students learn within a whole school year. In comparison, a one percentage point reduction of social segregation from one wave to the next decreases the effect of the ESCS on students' performance by 0.59. Because the maximum changes in social segregation

from 2000 to 2012 ranged approximately from -10 to +10 percentage points, the maximum effect would be to increase (or decrease) the effect of ESCS by about 6 points, corresponding to a 15 per cent increase (or decrease) in the effects of ESCS on performance.

Remarkably, gains in equality of opportunity are not brought about at the cost of excellence. In contrast, increases in the social segregation of an education system go hand in hand with decreases in students' average performance level (Table 1, Model 1). When the social segregation of an education system increases by about 10 percentage points, the average reading performance decreases by about 9 points. Thus, increases in equality of opportunity do not mean losses in terms of performance.

Table 1: Changes in an education system's school segregation and changes in reading test scores in PISA, country fixed-effects models

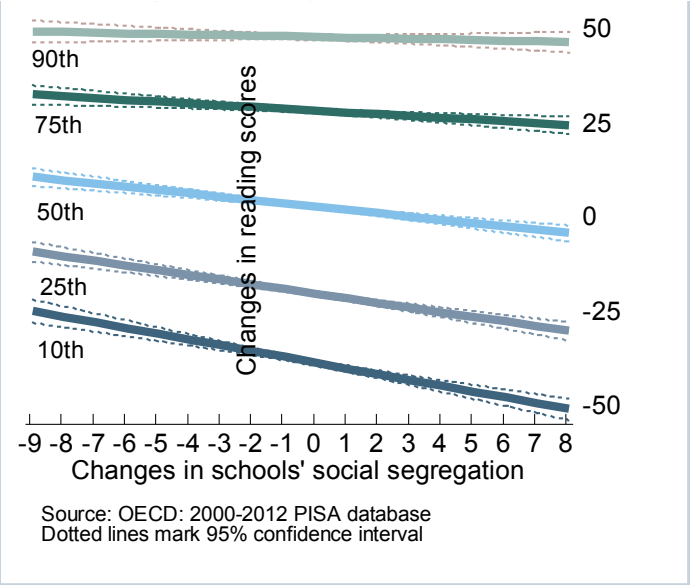
	Changes in reading 2000–12	
	Model 1 b/ci95	Model 2 b/ci95
ESCS	37.52***	37.35***
	[37.09, 37.95]	[36.93, 37.78]
Changes in school segregation	**-0.86*** **	**-0.88*** **
	[-1.12, -0.61]	[-1.14, -0.63]
Changes in school segregation ×ESCS		**0.59*** **
		[0.41, 0.78]
Constant	6.25***	6.27***
	[5.64, 6.86]	[5.66, 6.88]
N students	1 068 472	1 068 472
N schools	41 716	41 716
N countries	35	35
N waves	5	5

Note: All models are controlled for being foreign-born, having a foreign-born mother, or having a foreign-born father at the individual level; and for changes in the mean and the standard deviation of the ESCS at the country level.
Source: OECD: 2000–12 PISA database.

6.4 Who Wins and Who Loses?

We have seen that a decreasing social segregation is associated with a decreasing influence of family background. But how does this come about? Do socio-economically disadvantaged students improve at the expense of better-off students? To answer this question, Figure 2 predicts how the changes in schools' social segregation affect students at the 90th, 75th, 50th, 25th, and 10th percentile of the ESCS distribution within their country. The figure reveals that socio-economically disadvantaged students are most affected by changes in the socio-economic segregation between schools. For students at the 10th percentile of the ESCS distribution, it makes a difference of 25 points on the PISA reading test whether they live in a country that experienced the highest *increase* in social segregation compared to a country that experienced the highest *decrease* in social segregation. This difference is statistically significant and corresponds to progress made within more than one-half of a school year. The effect is about one-half of that size for students at the median of the ESCS distribution. For students at the 90th percentile of the ESCS distribution, the effect is close to zero and statistically non-significant for both reading and mathematics: high-ESCS students perform well regardless of whether the education system becomes more integrated or not.[iii]

Figure 2: Changes in schools' social segregation and in reading scores by ESCS percentiles



Is the same true for a possible trade-off between high- and low-performing students? I test this by using the percentage of students on the highest and the lowest performance levels as dependent variables. On average, a country has about seven to eight per cent top performers who are able to apply their knowledge to new situations and reflect on their solutions and opinion, and about 18 per cent low performers who are unable to summarize the main ideas of a text. When schools' segregation increases in a country, the change in top performers is close to zero, whereas the percentage of low performers increases (appendix, Table A6). To conclude, reduced social segregation between schools is not harmful for either socio-economically advantaged or high-performing students, whereas socio-economically disadvantaged and low-performing students benefit.

7. Conclusion and discussion

Do socio-economically advantaged students perform best in a differentiated education system whereas students from socio-economically disadvantaged families perform best in inclusive education systems? This chapter makes both a conceptual and a methodological contribution to this debate. In *conceptual* terms, I use a broad concept of differentiation, taking into account not only formal differentiation but also more 'hidden' forms of differentiation. Even in comprehensive education systems, schools can differ in terms of quality, and middle- and upper-class parents might find ways to differentiate their children from others. To capture not only formal but also hidden differentiation, I measure the social segregation among schools defined as the amount of ESCS variance between schools.

Methodologically, I contribute to the literature by analysing only changes *within* countries over time. The advantage is that unobserved country factors such as ethnic diversity, socio-economic cleavages, or cultural values do not influence the results to the extent that they are time-constant. This is an advantage over the comparative studies using institutional variation between countries.

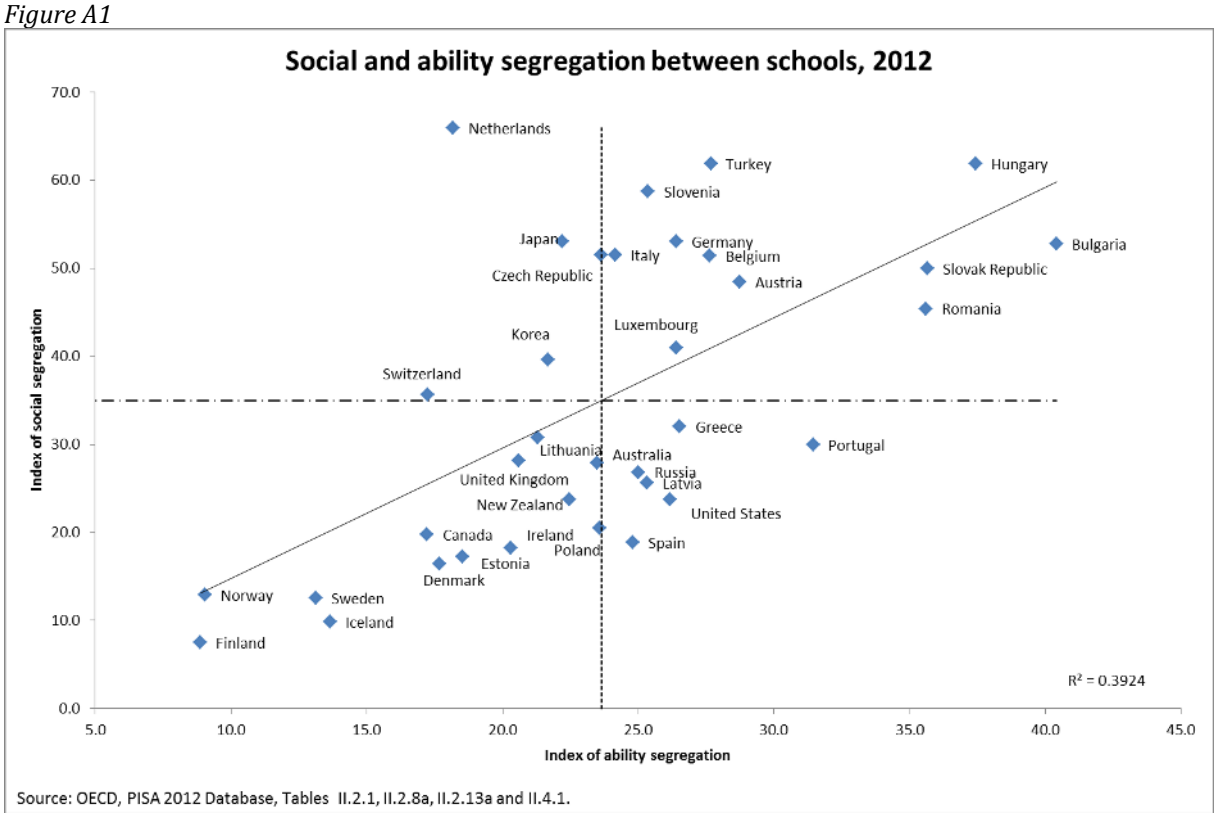
Using five waves of PISA data from 2000 to 2012, I find that when an education system becomes more socially inclusive, this is beneficial for students from socio-economically disadvantaged families and decreases the percentage of students with poor skills. At the same time, students from better-off families are not affected by changes in social segregation. They perform well anywhere – independent of whether they attend schools with students from socio-economically disadvantaged families or not. A country's proportion of top performers is not affected by changes in the social segregation between schools either. The findings indicate that there is no trade-off from promoting performance development in different groups of students. Instead, improving equality of opportunity, for example by making schools more socio-economically inclusive, promotes a higher average performance level without harming high-performing students.

One limitation of the analyses is that I am not able to identify the mechanisms behind the findings. For further research, it would be interesting to explore why students from socio-economically advantaged families perform well, relatively independent of the school system's social segregation. Another shortcoming is that I take into account only differentiation *between* schools but not differentiation *within* schools.

To conclude, contrary to the beliefs of many middle- and upper-class parents, school systems in which students from different socio-economic backgrounds learn together in the same schools do not harm middle- and upper-class children. These children perform well everywhere, independent of how socially inclusive the education system is. Socio-economically disadvantaged students, on the other hand, improve their reading and mathematics performance when school systems – tracked or comprehensive – become more socially inclusive. Thus, in tracked as well as in comprehensive school systems, it remains a challenge to provide equal opportunities by ensuring that schools do not become segregated by social background, thereby trapping disadvantaged students in disadvantaged schools. One of the main challenges in this enterprise may well still be to persuade middle- and upper-class parents that this will not harm their children – and the aim of this article is to contribute to this.

Appendix

Figure A1



Source: OECD, PISA 2012 Database, Tables II.2.1, II.2.8a, II.2.13a and II.4.1.

Figure A2

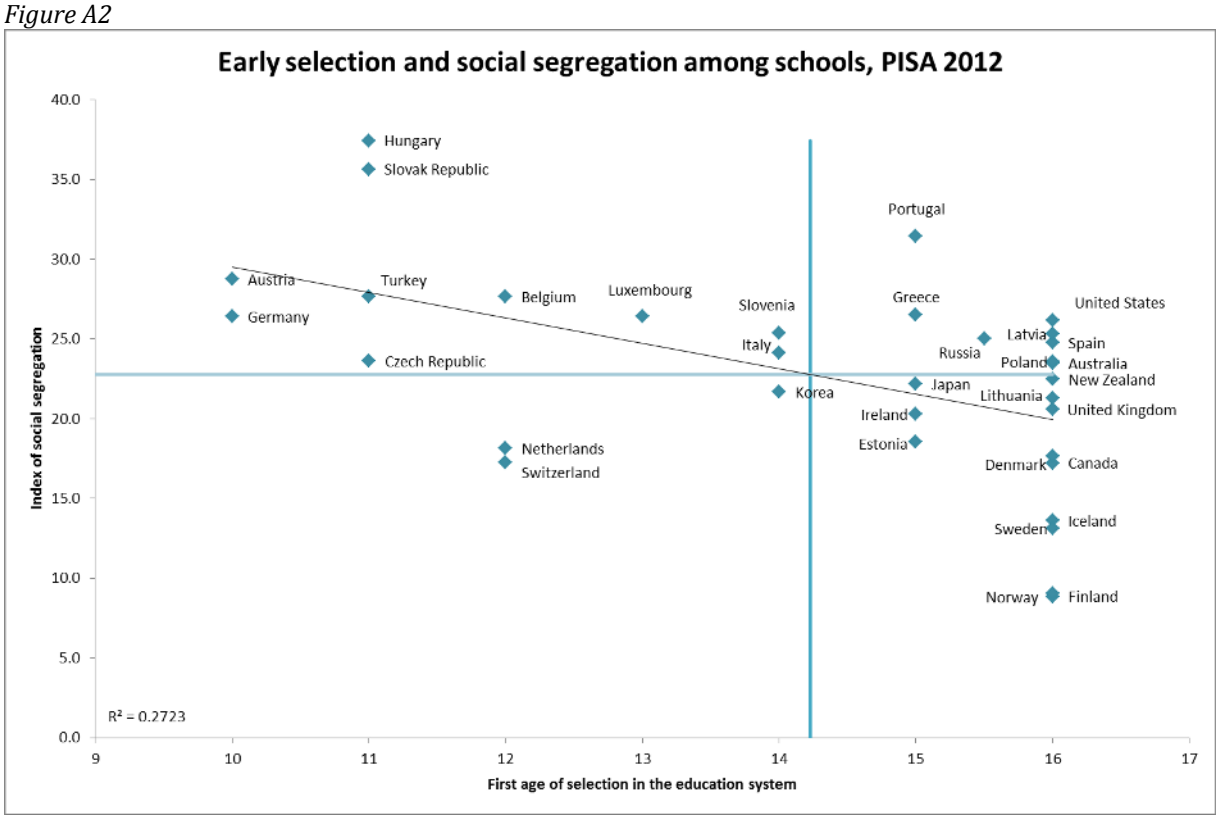


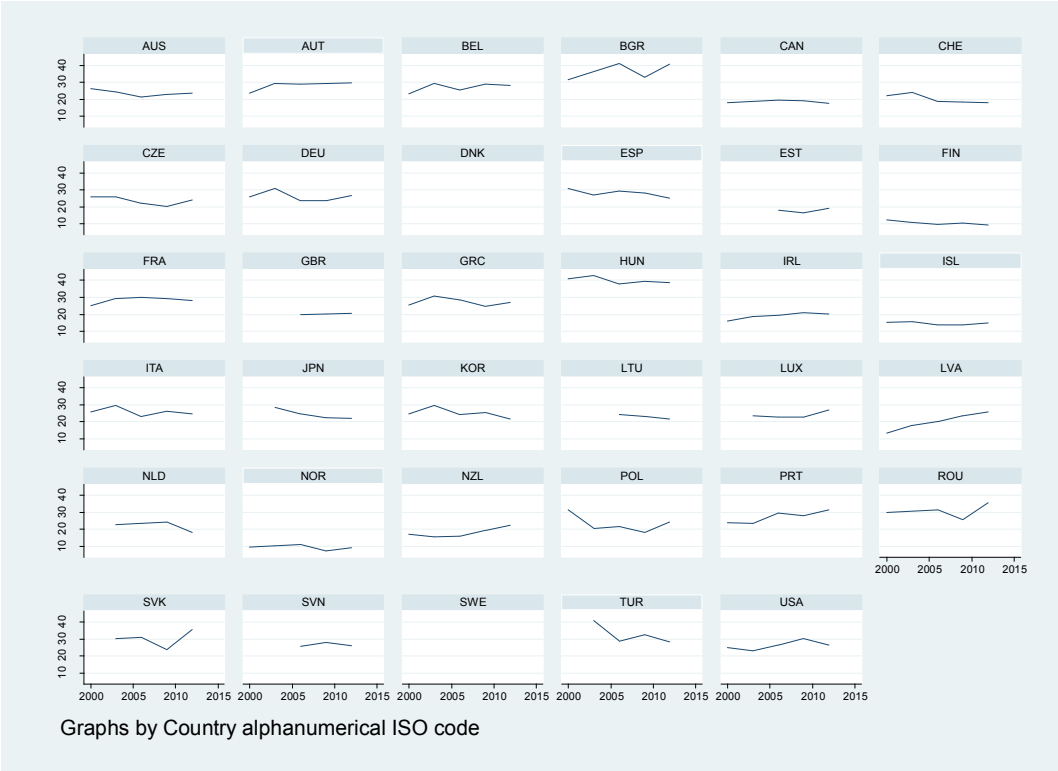
Table A1: Between-school variance in ESCS by country and year

	Proportion of between-school-variance in ESCS					Changes in the proportion of between-school variance in ESCS: Deviation from country mean				
	2000	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**
TUR		40.7	28.8	32.5	28.4		7.5	-4.4	-0.8	-4.9
POL	31.4	20.6	21.6	18.4	24.2	8.1	-2.6	-1.6	-4.8	0.9
JPN		28.6	24.8	22.3	22.2		3.3	-0.5	-3	-3.1
ESP	31.0	26.9	29.1	28.1	25.0	2.1	-1.9	0.3	-0.7	-3.8
NLD		22.6	23.5	24.2	18.2		-0.8	0.1	0.8	-5.2
CHE	22.2	24.1	18.8	18.2	17.9	1.4	3.3	-2	-2.5	-2.9
FIN	12.3	10.7	9.7	10.5	9.1	1.5	-0.1	-1.1	-0.3	-1.7
KOR	24.7	29.6	24.3	25.4	21.7	-1.2	3.7	-1.6	-0.5	-4.2
AUS	26.5	24.5	21.6	22.8	23.7	2.6	0.7	-2.2	-1	-0.2
LTU			24.2	23.1	21.6			0.5	-0.6	-2.1
HUN	41.1	42.9	38.0	39.4	38.6	0.7	2.5	-2.3	-1	-1.8
CZE	25.8	25.8	22.1	20.1	24.0	2.3	2.4	-1.4	-3.4	0.5
ITA	25.9	29.6	23.2	26.2	24.8	-0.3	3.5	-3	0.1	-1.4
CAN	18.2	18.9	19.6	19.1	17.8	-0.8	-0.1	0.7	0.1	-1.2
ISL	15.1	15.8	13.7	13.9	14.8	0.6	1.2	-0.9	-0.7	0.2
NOR	9.5	10.4	11.0	7.5	9.2	-0.1	0.8	1.4	-2.1	-0.4
SVN			25.8	28.1	26.3			-1.1	1.2	-0.6
DEU	26.0	30.8	23.5	23.8	26.6	-0.1	4.7	-2.5	-2.3	0.5
GBR			19.8	20.4	20.6			-0.3	0.3	0.6
EST			18.1	16.5	19.1			0.6	-0.9	1.7
USA	24.8	23.2	26.6	30.4	26.5	-1.5	-3.2	0.3	4	0.2
GRC	25.4	30.7	28.4	24.6	27.1	-1.8	3.5	1.2	-2.5	-0.1
SWE	12.0	10.8	12.5	13.9	13.8	-0.3	-1.6	0.2	1.5	1.5
FRA	25.1	29.1	30.0	29.4	28.0	-3.3	0.7	1.6	1	-0.4
LUX		23.7	22.8	22.8	26.8		0.6	-0.2	-0.3	3.7

IRL	16.2	18.6	19.4	20.8	20.3	-2.5	-0.1	0.7	2.1	1.6
BEL	23.3	29.2	25.4	28.8	28.1	-3.4	2.5	-1.3	2.1	1.4
DNK	13.0	17.3	12.3	15.9	17.8	-1.7	2.6	-2.3	1.3	3.2
NZL	17.3	15.7	16.1	19.5	22.4	0.1	-1.5	-1.1	2.3	5.2
SVK		30.3	31.0	24.0	36.1		1.8	2.4	-4.6	7.5
ROU	30.1		31.6	25.8	35.9	0.5		2	-3.8	6.3
AUT	23.6	29.4	29.1		29.6	-4	1.8	1.4		2
PRT	23.8	23.6	29.7	28.1	31.6	-2.5	-2.7	3.5	1.9	5.4
BGR	31.6		41.1	32.9	40.7	-3.6		5.9	-2.2	5.5
LVA	13.5	18.0	20.2	23.6	25.7	-5.1	-0.5	1.7	5.1	7.1

Source: OECS PISA database 2000-2012

Figure A3: Development of proportion of between-school variance in ESCS in PISA 2000-2012



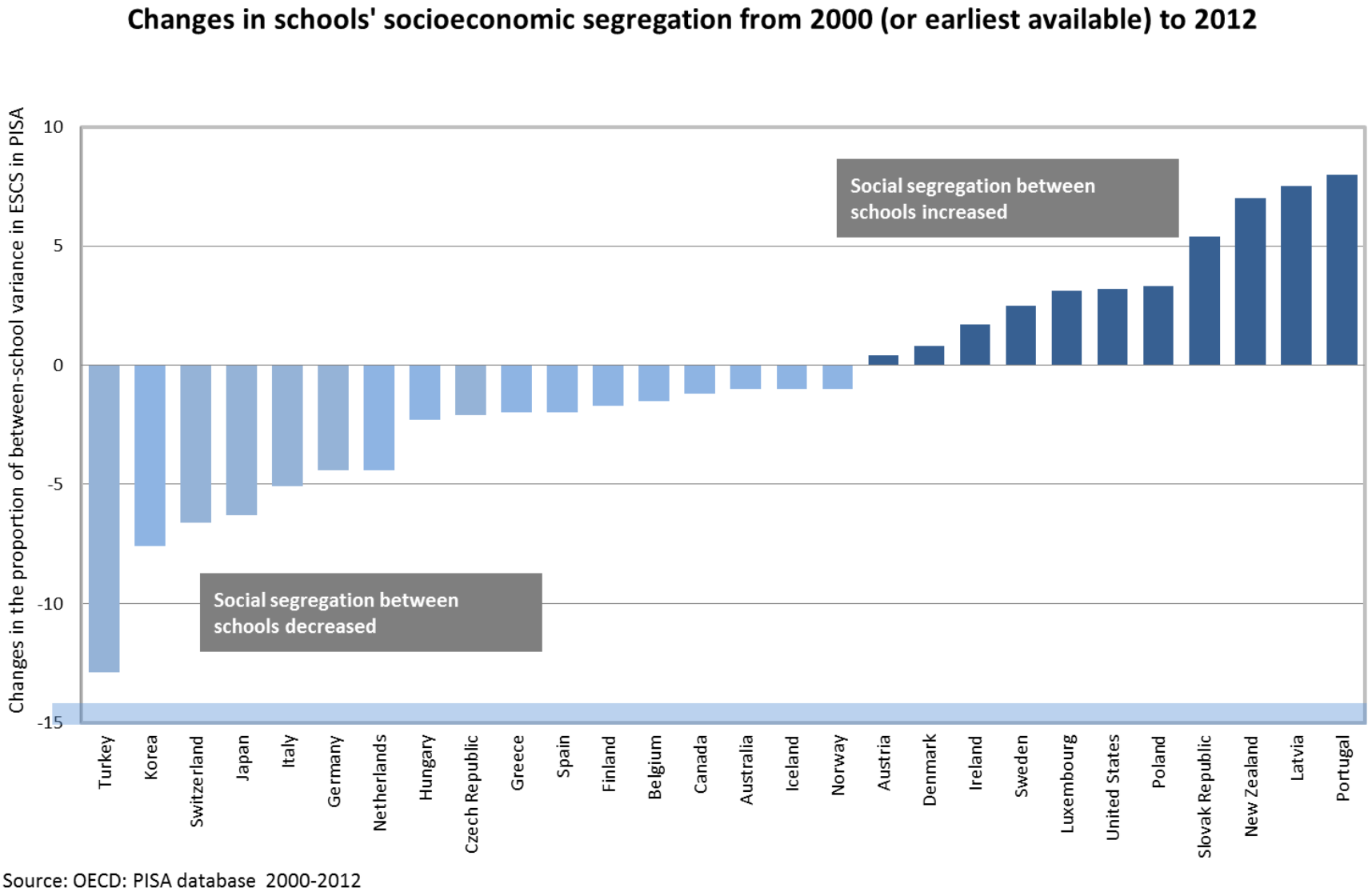
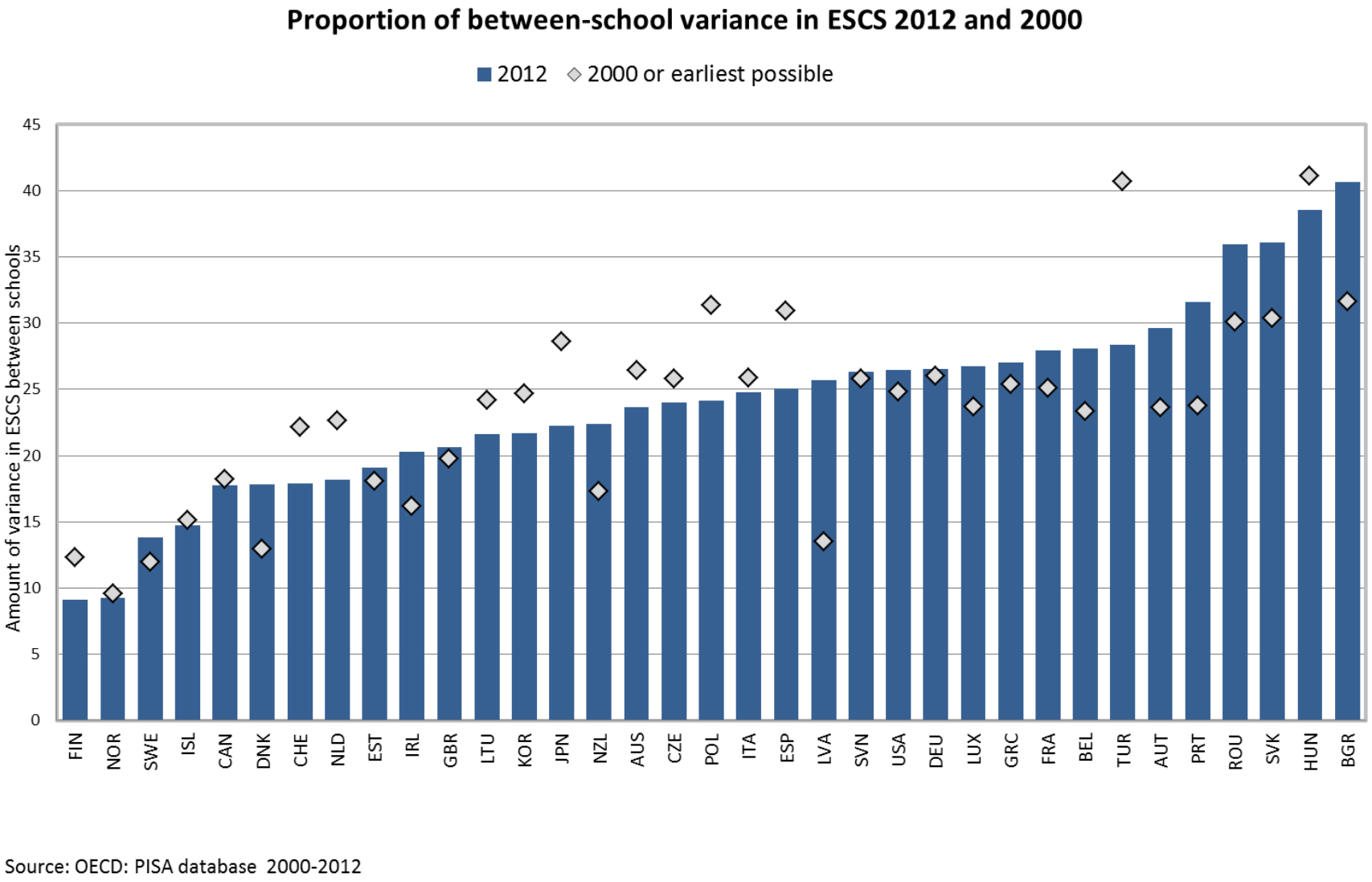

Changes in schools' socioeconomic segregation from 2000 (or earliest available) to 2012
Changes in the proportion of between-school variance in ESCS in PISA
10
5
0
-5
-10
-15
Social segregation between schools increased
Social segregation between schools decreased
Turkey
Korea
Switzerland
Japan
Italy
Germany
Netherlands
Hungary
Czech Republic
Greece
Spain
Finland
Belgium
Canada
Australia
Iceland
Norway
Austria
Denmark
Ireland
Sweden
Luxembourg
United States
Poland
Slovak Republic
New Zealand
Latvia
Portugal
Source: OECD: PISA database 2000-2012

Figure A4

Figure A5



Source: OECD: PISA database 2000-2012

Table A2: Mean score and percentage of top- and low-performers in reading by country and wave

	Mean score in reading					% Top-performers: Students on the highest competence levels 5 and 6 in reading					% Low-performers: Students below proficiency level 2 in reading				
	2000	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**
AUS	528	525	513	515	512	17.1	12.6	9	12	10.8	12.3	10.6	12.4	13.5	13.6
AUT	507	491	490		490	8.3	6.4	8		4.4	13.8	19.8	20.8		19
BEL	507	507	501	506	509	11.1	9.9	9.5	10.1	10.8	18.9	16.5	18.9	17.3	15.2
BGR	430		402	429	436	1.6		1.4	2.1	3.7	40.1		50.6	40.5	39.1
CAN	534	528	527	524	523	15.8	10.3	12.9	11.7	11.6	9.1	8.3	10.1	9.8	10
CHE	494	499	499	501	509	8.6	5.6	6.8	7.3	7.8	20	15.4	15.6	16.1	12.9
CZE	492	489	483	478	493	6.2	4.9	7.8	4.5	5.1	16.6	17.4	24.5	22.4	15.8
DEU	484	491	495	497	508	8.1	7.5	8.6	6.9	8	22.1	21.7	19.4	17.8	14.2
DNK	497	492	494	495	496	7.1	3.1	5	3.5	4.6	17.1	14.5	14.8	14.6	13.8
ESP	493	481	461	481	488	3.1	2.6	1.2	2.6	4.5	15.8	19.3	25	18.9	17.4
EST			501	501	516			4.9	5.2	7.1			12.9	12.5	8.4
FIN	546	543	547	536	524	17.6	11.4	14.9	13.2	11.6	6.4	5	3.9	7.5	10.8
FRA	505	496	488	496	505	7.5	5.1	5.2	8.8	11.5	14.7	16.3	21.2	19.6	18.1
GBR			495	494	499			7.8	7.3	8.1			18	17.8	15.9
GRC	474	472	460	483	477	4	3	2.2	4.2	3.4	24.1	22.9	27.1	20.7	21.5
HUN	480	482	482	494	488	4	3	3.6	5.2	4.3	22.6	19.1	20	17.1	19.3
IRL	527	515	517	496	523	13.6	7.2	10.3	6	10.3	10.6	10	11.2	16.5	8.9
ISL	507	492	484	500	483	8	5.2	4.5	7.5	4.3	14.2	16.7	19.3	16.3	20.1
ITA	487	476	469	486	490	4.5	3.5	4.3	4.8	5.5	18.1	22.3	25.8	20.5	18.7
JPN	522	498	498	520	538	8.4	7	7.6	12.2	17.1	10	17.9	17.5	13	9.1
KOR	525	534	556	539	536	3.9	9.5	20.7	11.6	12.6	5.1	5.6	5.3	5.4	7.2
LTU			470	468	477			3.4	2.3	2.3			25.1	23.7	20.1
LUX		479	479	472	488		3.6	4.2	4.7	7.5		21.1	22	25.5	21.4
LVA	458	491	479	484	489	3.7	3.9	3.1	2.2	3.1	29.1	16.3	19.9	16.8	16.5
NLD		513	507	508	511		7	7.9	8.9	8.9		10.2	14.4	13.3	13.3
NOR	505	500	484	503	504	10.6	7.7	6.3	7.4	9	17.1	16.6	21.3	14.7	14.9
NZL	529	522	521	521	512	17.9	15.2	14.6	15.1	12.9	13.6	13.5	13.7	13.7	15.4

POL	479	497	508	500	518	4.9	6.1	9.9	6.2	8.5	23	15.1	15.2	14.3	9.7
PRT	470	478	472	489	488	3.3	2.3	3.7	3.9	4.6	25.6	21.3	24.1	17	18.1
ROU	428		396	424	438	1.7		0.1	0.4	1	41.2		53.8	40.4	36.9
SVK		469	466	477	463		2.1	4.2	3.4	3.5		22.8	27	22	27.9
SVN			494	483	481			4.6	3.8	4			16.4	20.4	20.5
SWE	516	514	507	497	483	10.4	9.6	9.6	8.2	6.8	12	11.7	14	16.8	22
TUR		441	447	464	475		3.3	1.2	1.2	3.7		35.9	31.2	23.6	20.7
USA	504	495		500	498	11.2	7.5		9.2	7	17.2	18.5		17.3	15.9
average	497	497	488	493	496	8.2	6.4	6.7	6.6	7.1	18.2	16.6	20.4	18.2	17.2

Source: OECS PISA database 2000-2012

Table A3: Mean and standard deviation of ESCS by country and wave

	Mean ESCS					Standard deviation of ESCS				
	2000	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**
AUS	-0.02	0.04	0.22	0.27	0.25	0.79	0.88	0.73	0.68	0.79
AUT	-0.21	-0.26	0.03		0.08	0.85	0.86	0.8		0.85
BEL	-0.21	-0.03	0.07	0.16	0.15	0.88	1.01	0.86	0.85	0.91
BGR	-0.43		-0.47	-0.26	-0.28	0.88		1	0.94	1.05
CAN	0.18	0.21	0.3	0.44	0.41	0.9	0.93	0.79	0.78	0.86
CHE	-0.17	-0.23	0.02	0.13	0.17	0.96	1.02	0.88	0.85	0.89
CZE	-0.46	-0.05	-0.11	-0.07	-0.07	0.76	0.87	0.73	0.67	0.75
DEU	-0.01	0.01	0.19	0.2	0.19	0.9	1.08	0.89	0.85	0.93
DNK	0.18	0.08	0.45	0.45	0.43	0.89	0.98	0.8	0.77	0.84
ESP	-0.74	-0.51	-0.46	-0.21	-0.19	1.14	1.15	1.02	1.01	1.03
EST			-0.13	0.1	0.11			0.78	0.74	0.81
FIN	-0.18	0.06	0.19	0.39	0.36	0.92	0.97	0.76	0.72	0.77
FRA	-0.42	-0.32	-0.28	-0.14	-0.04	0.83	0.96	0.79	0.77	0.8
GBR			0.13	0.25	0.27			0.75	0.75	0.8
GRC	-0.36	-0.3	-0.22	-0.03	-0.06	0.98	1.04	0.92	0.91	1

HUN	-0.49	-0.31	-0.26	-0.16	-0.25	0.87	0.95	0.84	0.87	0.96
IRL	-0.33	-0.26	-0.06	0.08	0.13	0.91	0.93	0.8	0.8	0.85
ISL	0.24	0.55	0.61	0.72	0.78	0.91	0.93	0.83	0.78	0.81
ITA	-0.33	-0.29	-0.19	-0.03	-0.05	0.94	1.08	0.9	0.92	0.97
JPN		-0.42	-0.16	-0.07	-0.07		0.8	0.67	0.66	0.71
KOR	-0.57	-0.36	-0.16	-0.01	0.01	0.82	0.94	0.77	0.72	0.74
LTU			-0.26	-0.22	-0.13			0.85	0.84	0.92
LUX		-0.09	0	0.17	0.07		1.07	1.05	1.02	1.1
LVA	-0.61	-0.34	-0.44	-0.28	-0.26	0.81	0.88	0.79	0.79	0.89
NLD		-0.08	0.16	0.13	0.23		0.97	0.82	0.73	0.78
NOR	0.21	0.19	0.35	0.58	0.46	0.8	0.79	0.7	0.65	0.76
NZL	-0.07	-0.13	0.11	0.15	0.04	0.79	0.9	0.79	0.74	0.82
POL	-0.62	-0.41	-0.57	-0.3	-0.21	0.84	0.92	0.83	0.81	0.9
PRT	-0.81	-0.91	-0.8	-0.45	-0.48	1.11	1.34	1.24	1.13	1.19
ROU	-1.05		-0.69	-0.48	-0.47	1.08		0.88	0.8	0.94
SVK		-0.25	-0.18	-0.1	-0.18		0.94	0.84	0.76	0.92
SVN			-0.22	0.06	0.07			0.82	0.82	0.87
SWE	0.15	0.08	0.26	0.39	0.28	0.82	0.98	0.79	0.78	0.82
TUR		-1.15	-1.32	-1.14	-1.46		1.05	0.91	0.94	1.1
USA	0.07	0.05	0.2	0.24	0.17	0.87	0.98	0.87	0.88	0.97

Source: OECS PISA database 2000-2012

Table A4: ESCS percentiles, overall and within countries

	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
overall	-1.3	-0.9	-0.1	0.6	1.2
within countries (deviation from country mean)	-1.1	-0.6	0.0	0.7	1.2

Table A5: Changes in reading and mathematics test scores in PISA and changes in an education system's school segregation, country fixed-effects models

	Changes in reading 2000-2012		**Changes in mathematics 2003-2012**	
	M1	M2	M1	M2
	b/ci95	b/ci95	b/ci95	b/ci95
ESCS	37.52***	37.35***	38.82***	38.63***
	[37.09,37.95]	[36.93,37.78]	[38.36,39.29]	[38.17,39.08]
Changes in school segregation	**-0.86*****	**-0.88*****	**-0.30***	**-0.34****
	[-1.12,-0.61]	[-1.14,-0.63]	[-0.56,-0.05]	[-0.59,-0.09]
Changes in school segregation x escs		**0.59*****		**0.47*****
		[0.41,0.78]		[0.27,0.67]
_cons	6.25***	6.27***	3.80***	3.82***
	[5.64,6.86]	[5.66,6.88]	[3.08,4.52]	[3.10,4.54]
N students	1068472	1068472	935228	935228
N schools	41716	41716	36459	36459
N countries	35	35	35	35
N waves	5	5	4	4

Note: all models are controlled for being foreign-born, having a foreign-born mom, and having a foreign-born dad at the individual level and changes in the mean and the standard deviation of the ESCS at the country level.
Source: OECD: 2000-2012 PISA database

Table A6: Changes in schools' social segregation and changes in the percentage of top and low performers

	Changes in % top performers (proficiency levels 5+6)		**Changes in % low performers (below proficiency level 2)**	
	M1	M2	M1	M2
	b/ci95	b/ci95	b/ci95	b/ci95
ESCS	5.20***	5.23***	-10.05***	-9.97***
	[5.09,5.32]	[5.11,5.34]	[-10.22,-9.89]	[-10.13,-9.80]
Changes in school segregation	**-0.09*****	**-0.09*****	**0.27*****	**0.28*****
	[-0.14,-0.05]	[-0.14,-0.05]	[0.17,0.37]	[0.18,0.38]
Changes in school segregation x escs		**-0.08****		**-0.32*****
		[-0.13,-0.02]		[-0.39,-0.25]
_cons	0.34***	0.34***	-1.84***	-1.85***
	[0.23,0.46]	[0.23,0.46]	[-2.07,-1.62]	[-2.08,-1.63]
N students	1068472	1068472	1068472	1068472
N schools	41716	41716	41716	41716

N countries	35	35	35	35
N waves	5	5	5	5

Note: all models are controlled for being foreign-born, having a foreign-born mom, and having a foreign-born dad at the individual level; and changes in the mean and the standard deviation of the ESCS at the country level.
Source: OECD: 2000-2012 PISA database

The effect on top-performers is statistically significant but very close to zero (and negative if anything). With each percentage point increase in schools' social segregation, the percentage of top-performers decreases by 0.01 percentage points. As schools' social segregation maximally changes by less than 10%, the maximum change is less than 0.1 percentage points. The effect on low-performers, on the other hand, is more substantial with a change of 3 percentage points for the maximum change in schools' social segregation.

Table A7: The influence of changes in social segregation on changes in reading scores and on ESCS is robust when controlling for changes in educational expenditure or student-teacher-ratios

	Changes in reading 2000-2012 M1 b/ci95	**Changes in reading 2000-2012** M1 b/ci95
ESCS	37.02***	37.02***
	[36.53,37.51]	[36.53,37.51]
Changes in school segregation	-0.87***	-0.91***
	[-1.17,-0.57]	[-1.20,-0.62]
Changes in school segregation x escs	0.72***	0.58***
	[0.51,0.93]	[0.37,0.79]
Changes in educational expenditure	-0.00~	
	[-0.00,0.00]	
Changes in student-teacher-ratios		-0.62
		[-1.47,0.23]
_cons	6.50***	6.10***
	[5.78,7.22]	[5.42,6.79]
N	699203	769004

Note: all models are controlled for being foreign-born, having a foreign-born mom, and having a foreign-born dad at the individual level; and changes in the mean and the standard deviation of the ESCS at the country level.
Sources: OECD: 2000-2012 PISA database, Eurostat (2015): Education and Training for annual expenditure on public and private educational institutions per pupil/student in PPS, for all levels of education combined and student-teacher ratio and average class size (ISCED 1-3)

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Notes

i I use the student weights given by the OECD and adjust them in such a way that each country wave contributes equally to the results. The standard errors are allowed to be clustered within schools to take the sampling design into account.

ii To see whether my results are robust to changes in immigrant populations, I run two-step estimates in which the effects of being born in a foreign country and having a foreign-born mother or father can differ in each country and at each wave. Results do not change.

iii Results are robust when controlling for changes in educational expenditure or student–teacher ratios (appendix, Table A7).

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