4

How social and academic segregation are related to school-choice policies

This chapter investigates whether school choice may affect social and academic diversity within the schools. It compares the degree of social diversity between public and private schools, and examines whether the changes in social and academic segregation may be related to schools' admissions policies.

PRIVATE SCHOOLS ARE USUALLY MORE SOCIALLY STRATIFIED THAN PUBLIC SCHOOLS

How is school choice related to sorting students across schools? One may analyse first whether the coexistence of the private sector with the public sector is related to the degree of school segregation at the national level. This can be done using the diversity index.[1] This index measures how social diversity, as observed at the country level, is or is not reproduced within schools. Diversity within schools ensures that students from different backgrounds may interact with each other. It is expected to have a positive impact on social cohesion (Borgonovi and Pokropek, 2017[1]). The mutual information index (hereafter called the no diversity index) allows for a consideration of more than two groups of students. In the following, four groups are defined using the quartiles of the socio-economic index at the country level (see Annex A for details). The no-diversity index H goes from 0 (no segregation) to 1 (full segregation).[2]

The highest levels of social segregation according to this indicator (meaning the lowest degree of social diversity within schools) are observed in several Latin American countries and economies (Chile, Ciudad Autónoma de Buenos Aires [Argentina], Colombia, Mexico and Peru), in the four provinces and municipalities of China that participated in PISA 2015 (Beijing, Shanghai, Jiangsu and Guangdong) and in Indonesia (Figure 4.1). In these countries and economies, the no-diversity index is at least 0.20, meaning twice as high as the level of segregation that prevails in Finland, Kosovo, the Republic of North Macedonia and Norway, for instance.

One of the advantages of the no-diversity index is that it is decomposable (Frankel and Volij, 2011[2]). This property is useful for measuring segregation within the public and private sectors, as well as the discrepancies in school enrolment between these two sectors. Formally, the decomposition can be written as the sum of three components:[3]

- A first component measures the social segregation observed between public and private schools. It compares the social composition of the enrolment (taken as a whole) of private schools with the social composition of enrolment (taken as a whole) of public schools. One expects to observe a positive contribution to the overall level of social segregation if, for instance, private schools tend to select more affluent students because of tuition fees. This contribution is represented by the dark blue segment of the bars in Figure 4.1. In a few countries, the difference in the social composition of public and private schools has a marked impact on the level of social diversity within schools at the aggregated level. For instance, in Brazil, Ciudad Autónoma de Buenos Aires (Argentina), Colombia, the Dominican Republic, Lebanon, Peru, Malta, Spain and Uruguay, this difference accounts for more than a quarter of the overall level of segregation. In the vast majority of countries, however, the difference in the composition of private and public schools alone does not account for more than 10% of the degree of segregation. In these cases, the level of social segregation depends not only on the social difference between private and public schools, but because social sorting may occur amongst public schools – or amongst private schools.

- Two components measure the degree of segregation across private and public schools separately, weighted by the proportions of 15-year-old students enrolled in these sectors in the country/economy. At the country level, intra-sector segregation may be due to the fact that

grade repetition and streaming into different education tracks are often related to the socio-economic status of students. One thus also expects to find segregation within both private and public schools. Competition between schools within the same sector, i.e. public or private, may also create segregation. For instance, schools may choose to limit their offer to specific conditions (for instance, provide remedial education for low achievers who struggle in the traditional school system, or propose an education for "gifted" children). Even in the absence of competition, enrolment is expected to reflect residential segregation, and this may be reinforced over time, as parents' decisions about where to live are partly driven by the profile of the schools – and the schools' student population – that are available to them.
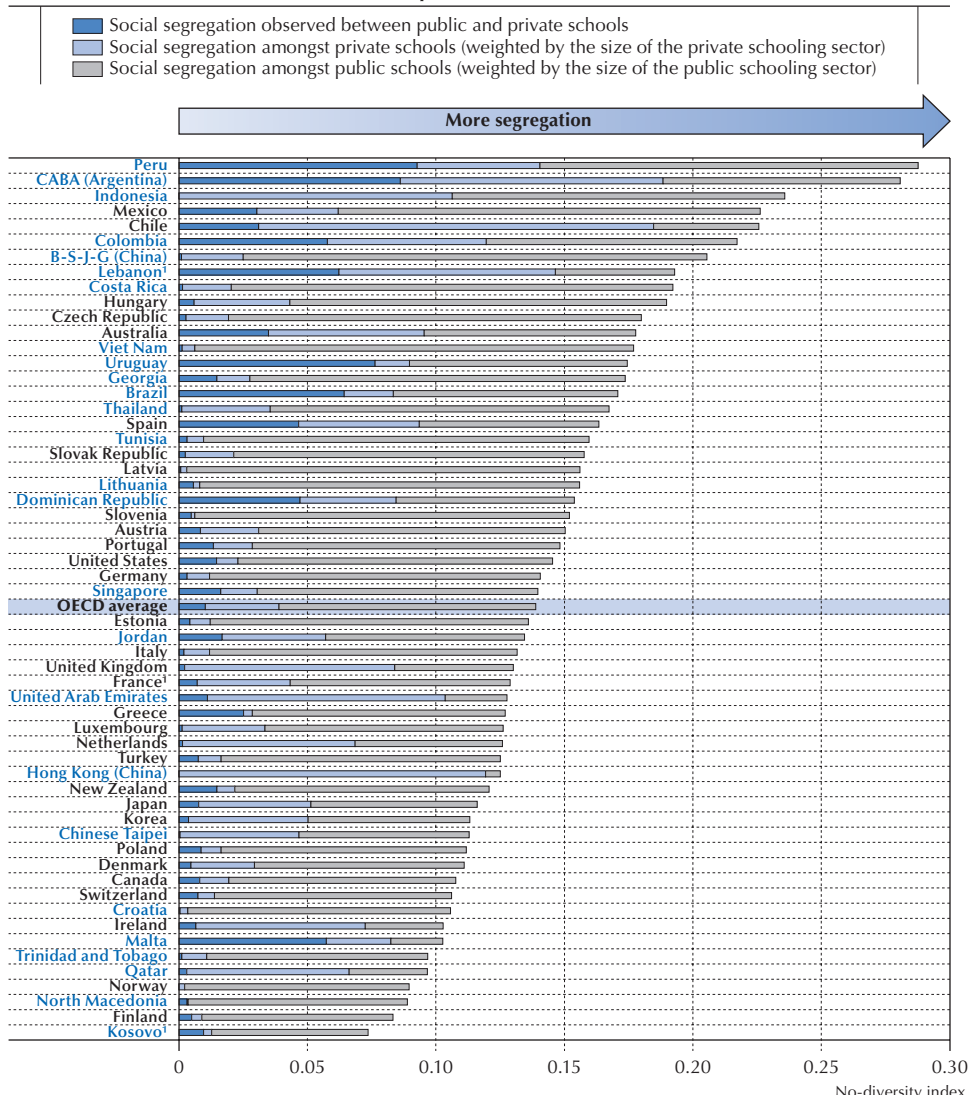
After taking into account the respective weights of the private and public sectors within a country/economy, the segregation observed in private schools does not contribute much to the overall segregation in the country/economy. Since students in most countries were more often enrolled in public schools than in private schools, the contribution of public schools to overall segregation is usually greater (the grey segments of the bars in Figure 4.1) than that of private schools. Exceptions are countries where the share of private schools is very large. It is, for instance, the case in Chile, Ireland and the Netherlands (the light blue segments of the bars).

However, in a large majority of countries, the degree of segregation is greater in private schools than in public schools. Differences are especially striking in Brazil, Chile, Colombia, Italy, Jordan, Mexico, Poland, Portugal, Tunisia and Turkey (Figure 4.2). The segregation in private schools is measured by considering only the students enrolled in private institutions. In many countries, private schools are expected to offer a more differentiated education (for instance, distinct curriculum or pedagogical practices) than public education does – and thus may attract different types of students.[4] This is especially true when families are offered financial support – either directly or indirectly through public funding to schools – to send their child to private school. Middle- or even low-income students may enrol in some private schools, but not necessarily the same private schools as those attended by the most advantaged students.

In 9 countries, however, segregation is greater in public schools than in private schools. These differences are especially wide in Costa Rica, the Republic of North Macedonia, Slovenia and Viet Nam. This may reflect either school selectivity or the large differences in the social composition of schools related to where they are located.

Figure 4.1 ■ **Contributions of public and private schools to social segregation amongst schools**

Decomposition of the no-diversity index based on the contributions of public and private schools

■ Social segregation observed between public and private schools
■ Social segregation amongst private schools (weighted by the size of the private schooling sector)
■ Social segregation amongst public schools (weighted by the size of the public schooling sector)

More segregation

No-diversity index

1. In France, Kosovo and Lebanon, the proportion of 15-year-old students in modal grade schools is lower than 80% (see Table B.3), and one should interpret with caution the comparison with other countries.
Notes: All analyses are restricted to schools with the modal ISCED level for 15-year-old students.
Public schools are those managed by the local government. Private schools are private independent schools and those funded by government but managed by not-for profit charitable trusts, including academies and free schools.
OECD average refers to the arithmetic mean across all OECD countries for which data are available.
Countries and economies are ranked in descending order of the overall level of segregation.
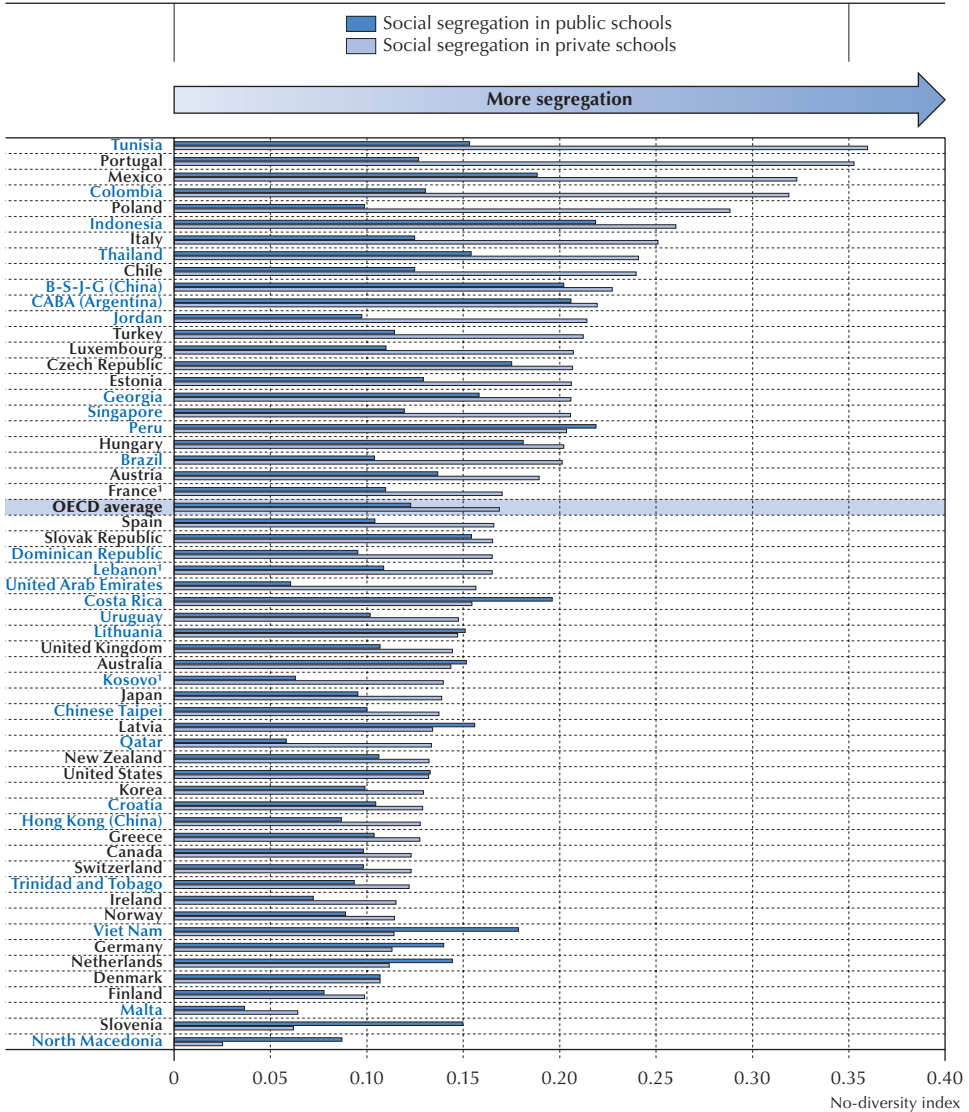**Source:** OECD, PISA 2015 Database, Table 4.2.

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Figure 4.2 ▪ **Social segregation, by type of school**
No-diversity index

■ Social segregation in public schools
■ Social segregation in private schools

More segregation →

1. In France, Kosovo and Lebanon, the proportion of 15-year students in modal grade schools is lower than 80% (see Table B.3), and one should interpret with caution the comparison with other countries.
Notes: All analyses are restricted to schools with the modal ISCED level for 15-year-old students.
Public schools are those managed by the local government. Private schools are private independent schools and those funded by government but managed by not-for profit charitable trusts, including academies and free schools.
Countries and economies are ranked in descending order of the no-diversity index in private schools.
Source: OECD, PISA 2015 Database, Table 4.3.

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THE RELATIONSHIP BETWEEN SEGREGATION ACROSS SCHOOLS AND SCHOOL ENROLMENT PRACTICES IS AMBIGUOUS

How are academic and social segregation related to school-choice policies? School-choice enrolment practices provide two proxies of the degree of actual choice families can exercise: academic selectivity, as a measure of possible "cream skimming" by schools, and residence-based criteria, as a measure of the degree choice is limited by home location. Cross-country comparisons suggest that, in 2015, the countries where more schools selected their students based on prior academic performance were characterised by greater academic stratification, as expected (Figure 4.3). The degree of segregation of disadvantaged students across schools at the country level was negatively correlated with the proportion of students in schools whose principals always consider residence as a criterion for admission to school. But this correlation is weak, and large variations between countries are observed (Figure 4.4). Several other country specificities, notably the degree of residential segregation, are expected to affect school segregation – and for this reason it may be difficult to observe direct relations.

This finding may be explained more by school practices than by school choice. Indeed, academic and social segregation across schools are not only due to schools' enrolment practices. Academic segregation, for instance, is expected to be linked with the coexistence of different streams: vocational and general schools usually select students with different academic backgrounds. In addition, the school segregation indices may depend on grade repetition, especially if the repeaters are expected to be still in lower secondary education while the "modal grade" corresponds to upper secondary education. Upper secondary education is commonly more selective than lower secondary education. This means that the correlation observed at the country level may be due to the fact that countries with the largest proportions of selective schools are also countries where students are streamed into different education tracks at a young age, or where larger proportions of students repeat a grade in primary or lower secondary school. Moreover, a change in grade repetition policy that would result in changes in the proportion of repeaters amongst 15-year students is expected to be reflected in segregation indices.

By observing country-level trends in PISA results over several cycles, one may compare how segregation indicators have evolved within countries when school selectivity has changed, using a series of fixed-effect regressions. Formally, it corresponds to the following equation at the country level:

$$Y_{ct} = \alpha_c + \alpha_t + X_{ct} + \varepsilon_{ct} \tag{1}$$

where Y_{ct} corresponds to the outcomes observed at the country level (social or academic segregation), X_{ct} the characteristics of schools based on aggregated school-level data (such as the proportion of academically selective schools in the country, the proportion of grade repeaters, etc.) observed in cycle t of PISA. The value $(\alpha_t)_{t=(2009, 2012, 2015)}$ is a set of cycle-specific dummies that capture potential changes that are common to all countries in PISA, and (α_c) is a set of country-specific fixed effects that capture the characteristics of the school systems that are stable over time. Because of these country-specific fixed effects, the estimation of the

variables (such as school-enrolment practices) on the dependant variable (such as the level of segregation) depends on the changes in these variables over time within the same country. Controlling by change in the proportion of grade repeaters or students in vocational training is intended to account for other institutional changes, such as policies aimed at reducing grade-repetition rates.

Figure 4.3 ■ **Dissimilarity index for low-achieving students in reading and school admissions based on academic performance**
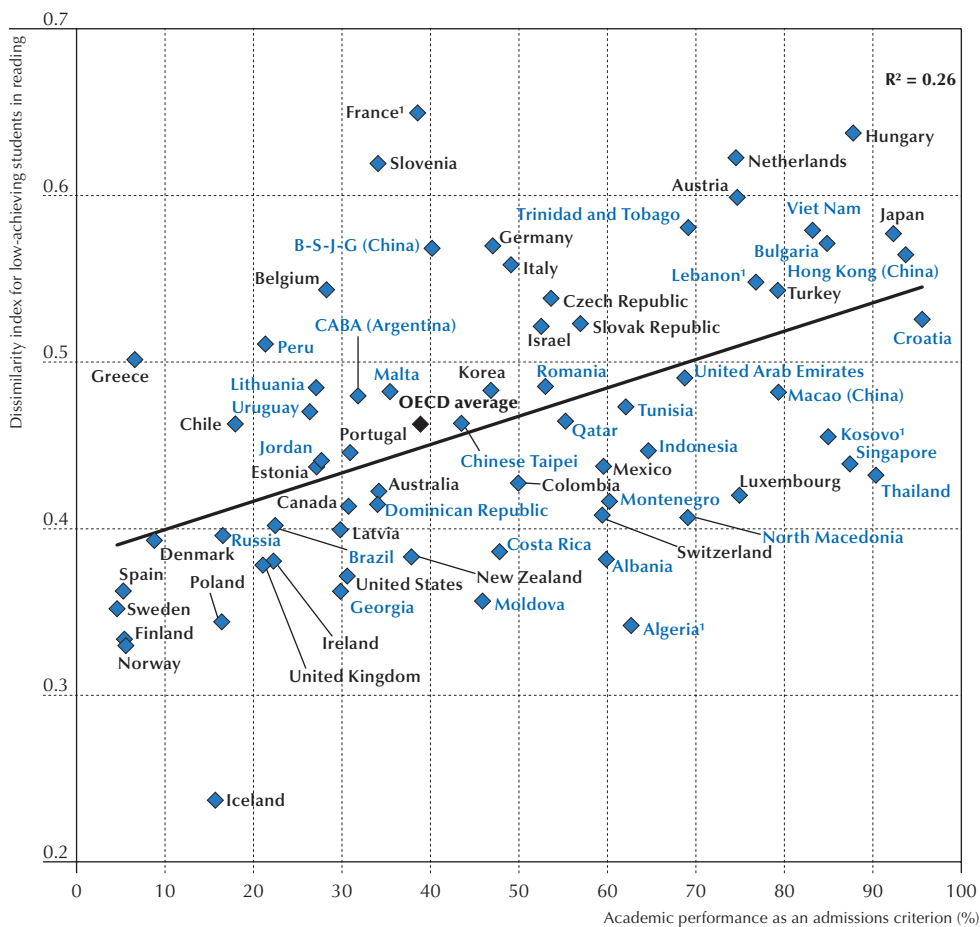
1. In Algeria, France, Kosovo and Lebanon, the proportion of 15-year-old students in modal grade schools is lower than 80% (see Table B.3), and one should interpret with caution the comparison with other countries.
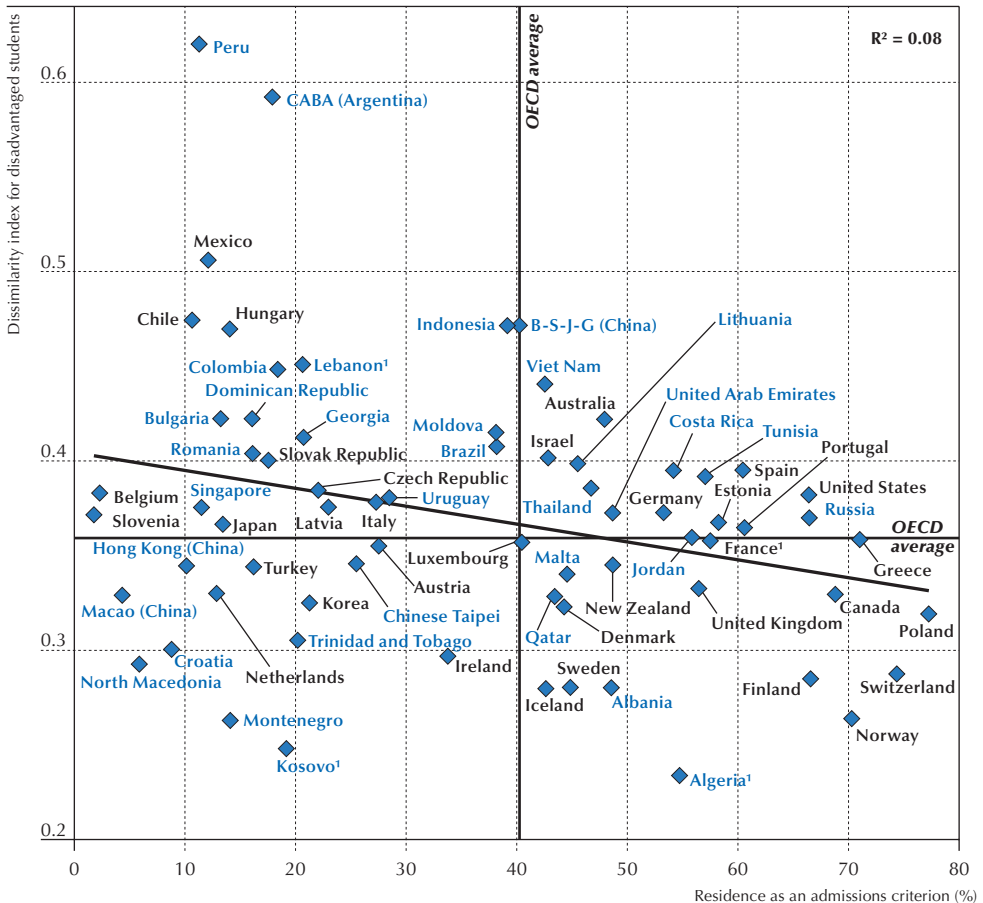**Notes:** All analyses are restricted to schools with the modal ISCED level for 15-year-old students.
The R^2 value indicates the proportion of the dissimilarity index for low-achieving students in reading that is accounted for by school selectivity based on academic performance across education systems. It is a measure of the strength of the relationship between the dissimilarity index for low-achieving students in reading and school selectivity based on academic performance at the country level.
Source: OECD, PISA 2015 Database, Table 4.4.
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Figure 4.4 ▪ **Dissimilarity index for disadvantaged students and school admissions based on residence**

1. In Algeria, France, Kosovo and Lebanon, the proportion of 15-year-old students in modal grade schools is lower than 80% (see Table B.3), and one should interpret with caution the comparison with other countries.
Notes: All analyses are restricted to schools with the modal ISCED level for 15-year-old students.
Disadvantaged students are students in the bottom quarter of the PISA index of economic, social and cultural status (ESCS) in their own country.
The R² value indicates the variance of the dissimilarity index for disadvantaged students that is accounted for by differences in school selectivity based on residence across education systems. It is a measure of the strength of the relationship between the dissimilarity index for disadvantaged students and school selectivity based on residence at the country level.
Source: OECD, PISA 2015 Database, Table 4.5.
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The 2009, 2012 and 2015 cycles of PISA are used for estimations as they provide consistent measures of the criteria applied for enrolment. When taking into account the unobserved characteristics of countries and economies (such as urban segregation, commuting facilities, etc.), empirical evidence does not support the claim that residence-based enrolment policies always increase social segregation (i.e. that catchment areas would trap disadvantaged students in

low-performing schools). A decrease in the proportion of students in schools that use residence-based selection has no significant impact on the social diversity of schools or on the isolation of disadvantaged students (Figure 4.1). Relaxing residence-based regulations is even related to a tiny increase in the concentration of advantaged students in certain schools. A 10 percentage-point increase in the proportion of students in residence-based schools would result in a decrease in the isolation index from 0.26 to 0.25. Moreover, the negative correlation between residence-based rules and the concentration of advantaged students reflects a short-term impact. Strict school-zoning laws may affect families' choice of where they live and thus, in the long term, may reinforce residential segregation. The short-term correlation measured here may be reversed over the long term if relaxing the link between residence and school admissions prompts middle-class families to consider residing in mixed neighbourhoods.

On the other hand, an increase in the proportion of schools that always use academic criteria for enrolment is associated with a slight decrease in the level of social segregation amongst schools, as measured by the no-diversity index (Table 4.1, column 1). This may be explained by the fact that when schools rely more on academic criteria, they may enrol resilient disadvantaged students, i.e. those disadvantaged students who perform well at school.[5] The impact is small, though: an increase of 10 percentage points in the proportion of students in selective schools shifts by only 0.003 the level of social segregation (from a baseline of 0.17).

Table 4.1 ▪ **Social and academic segregation, and school-stratification policies, 2009-15**

Panel estimates, country-level regressions

	No-diversity index (multigroup ESCS)		Isolation index for disadvantaged students		Isolation index for socio-economically advantaged students		Isolation index for low-achieving students in reading		Isolation index for high-achieving students in reading	
School admissions based on academic performance (%)	**-0.034**	(0.017)	-0.029	(0.026)	**-0.062**	(0.029)	-0.038	(0.038)	**-0.087**	(0.038)
School admissions based on residence (%)	-0.028	(0.024)	-0.003	(0.035)	**-0.089**	(0.039)	-0.067	(0.053)	**-0.107**	(0.052)
Vocational programmes (%)	**-0.090**	(0.040)	**-0.131**	(0.060)	**-0.142**	(0.066)	0.046	(0.089)	0.050	(0.088)
Grade repetition (%)	-0.003	(0.005)	-0.011	(0.008)	-0.002	(0.008)	0.005	(0.011)	0.008	(0.011)
Private schools (%)	0.043	(0.032)	0.018	(0.048)	0.073	(0.053)	0.070	(0.071)	-0.004	(0.070)
Intercept	**17.607**	(1.433)	**20.426**	(2.157)	**27.304**	(2.386)	**27.181**	(3.203)	**31.685**	(3.154)
Country fixed effect	yes		yes		yes		yes		yes	
Number of observations	177		188		188		188		188	
R²	0.11		0.07		0.13		0.03		0.09	

Notes: All analyses are restricted to schools with the modal ISCED level. The results above may thus differ from those estimated on the entire sample of 15-year-old students.

Disadvantaged students are students in the bottom quarter of the PISA index of economic, social and cultural status (ESCS) in their own country.

Data are aggregated at the country/cycle level.

Segregation indices are rescaled from 0 to 100.

Standard errors are indicated in parentheses.

Values that are statistically significant at the 10% level are indicated in italics and those at the 5% level are indicated in bold.

Source: OECD, PISA 2009, PISA 2012 and PISA 2015 Databases.

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The result is also observed when taking into account the proportion of students in private schools at the country level. Private schools are often more academically selective but may also be less accessible to disadvantaged students if they charge fees and in the absence of financial support for low-income families. Using both the proportion of students enrolled in private schools and those attending selective schools helps to disentangle the two effects. While an increase in academic selectivity tends to be related to a decrease in social segregation, a larger share of private schools in a country/economy tends to be positively related to social segregation (although not significantly). The estimated impact is weak, however. School-enrolment practices, and the share of private schools in an education system, are only proxies of the intensity of school choice in one country/economy. The estimates are thus attenuated measures of the impact of these policies.

Regarding academic segregation, once the potential confounding factors and country-specific effects are taken into account, an increase in the proportion of students in schools that always use residence-based criteria for enrolment is related to lower concentrations of high achievers in schools. Again, the impact is weak, and the estimates show no significant effect on the concentration of low achievers in schools. This may be explained by the fact that these correlations correspond to short-term effects, while school enrolment policies may take time to produce their full effects (for instance if it shifts household preferences regarding residential segregation). Moreover, the link between residence-based and academic segregation is only indirect, as it is expected mostly to affect the social composition of schools.

Surprisingly, while a positive cross-country correlation is observed between the selectivity of schools and the academic segregation index (Figure 4.3), panel estimates suggest a negative correlation with a change in the concentration of high achievers in certain schools (Figure 4.1). While this result may appear counterintuitive, it may be because a larger number of schools with similar enrolment practices dilutes the effects of those practices. If 10% of schools select their students based on their academic records, then they might end up with the highest-performing students. However, if 80% of schools attempt to select their students based on their academic performance, then the high-performing students in the system may be distributed across more schools. Moreover, even if schools use academic performance as a criterion for enrolment that does not mean that they always select only the top-performing students or that they do not use other admissions criteria as well. For instance, in some countries, regulations may encourage, if not require, schools to accept students with a mix of abilities and socio-economic backgrounds.

However, once other confounding factors are taken into account, an increase in the proportion of students in private schools is positively related to the isolation of low achievers in some schools.

The relationship between the proportions of grade repeaters and students in vocational tracks, and the academic segregation indices appears negligible, once country fixed effects are taken into account.

Notes

1. This is a common property with the square roots index proposed by Hutchens for binary variable (see (OECD, 2017[3])). The H indicator used here has the advantage of dealing with more than two groups (here, the four groups defined by the quartiles). It corresponds to a measure of relative social diversity within schools. It can be compared to the social inclusion index commonly used in PISA publications, which relies on the continuous measure of socio-economic status; but this estimator cannot be decomposed additively.

2. The index is sometimes called the Theil index or Mutual Information Index (Frankel and Volij, 2011[2]). In practice, it is usually much lower than 1, except when a very small proportion of some groups in some schools is observed.

3. Formally $H = H^{Priv/Pub} + \theta^{Public} H^{Public} + \theta^{Private} H^{Private}$ with $H^{Priv/Pub}$ is the no-diversity index, measured by comparing the populations of 15-year-old students in private and public schools (taken as only two big entities); H^{Public} and $H^{Private}$ the no-diversity indices estimated amongst respectively public and private schools; $\theta^{Private}$ and θ^{Public} the proportion of 15-year-old students in public and private schools.

4. This has been observed, for instance, in France (Tavan, 2004[4]; Givord et al., 2016[5]).

5. This may also explain why the proportion of students in vocational tracks has the strongest negative correlation with social segregation according to the results shown in Table 4.1.

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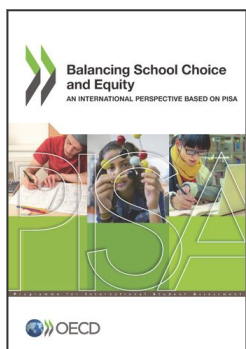
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