4

How School Characteristics are Related to Low Performance

This chapter examines the incidence of low performance across schools, and the school characteristics that are most strongly related to poor student performance. It focuses on the socio-economic profile of schools, school leadership, teachers' practices and behaviour, extracurricular activities, and the resources, both human and material, available at schools that can affect student performance.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Student performance at school is influenced not only by students' individual backgrounds, attitudes and behaviours, as discussed in Chapters 2 and 3, but also by the school they attend. This chapter examines new analyses that offer an in-depth look at how teachers' attitudes, expectations and behaviour can influence the likelihood of low performance. The chapter concludes with a description of how the educational resources available to schools and the administration of schools are linked to students' low performance (Figure 4.1).

What the data tell us

- Around 35% of the variation in the proportion of low performers in mathematics within countries can be traced to differences between schools, on average across OECD countries.
- Around 14% of all students attend schools where at least one in two students are low performers.
- Students attending schools where teachers are more supportive and have better morale are less likely to be low performers, while students whose teachers have low expectations for them and are absent more often are more likely to be low performers in mathematics, even after accounting for the socio-economic status of students and schools.
- The quality of educational resources is lower, and the incidence of teacher shortage is higher, in schools that have a large concentration of low performers, on average across OECD countries, even after accounting for students' and schools' socio-economic status.

■ Figure 4.1 ■

School characteristics and low performance

Potential areas of risk	Sub-areas	Risk factors
School composition	Socio-economic profile	Concentration of disadvantaged students
School learning environment	School leadership	Low expectations for students
		Ability grouping
	Teaching practices	Weak teachers' support for students
		Weak teacher morale
		Teacher absenteeism
	After-school opportunities	Lack of academic extracurricular activities
		Lack of creative extracurricular activities
	Parents involvement in school	Lack of parental pressure for high achievement
School resources and administration	Educational resources	Quality of school's educational resources
		Teacher shortage
	School type	Public school/Private school

HOW ARE LOW PERFORMERS DISTRIBUTED ACROSS SCHOOLS?

Variations in low performance between schools

Research examining the effects of school quality, compared with family background, on student achievement has shown that within-school differences in student achievement tend to be greater than between-school differences (e.g. Coleman et al., 1966; Baker, Goesling and LeTendre, 2002). On average across OECD countries, about 37% of the variation in student performance in PISA 2012 was observed between schools, while the remaining 63% was observed within schools (OECD, 2013a). This shows that the influence of schools on student achievement is substantial, even if students' own backgrounds are relatively more influential (student background is explored in Chapter 2 of this report). Other studies have identified a number of school characteristics and practices that seem to be the most effective for learning and for improving student achievement (Scheerens, 2000; Hopkins et al., 2014; Madden, 2001; Creemers, 2006; Lenkeit and Caro, 2014).

In order to pinpoint where the low performers are, it is important to determine whether variations in low performance stem from differences within or between schools. The larger the percentage of the variation in low performance observed between schools, the more concentrated are low performers in particular schools; the larger the percentage that is explained by differences within schools, the more evenly distributed are low performers across a school system.

Figure 4.2 shows that on average across OECD countries, around 35% of the variation in low performance in mathematics in each country/economy can be traced to differences between schools. This substantial between-school variation indicates that low performers are concentrated in particular schools of the education system. In 23 out of the 64 countries and economies that participated in PISA 2012, between-school differences explain 40% or more of the variation in low performance in mathematics. In Germany, Hungary, Liechtenstein, the Netherlands and Slovenia, between-school differences explain 55% or more of the variation, indicating significant concentrations of low performers within particular schools. By contrast, in Albania, Finland, Iceland, Norway, Poland and Sweden, between-school differences explain only 15% or less of the variation in low performance observed, indicating that low performers in these countries are more likely to attend the same schools as better-performing students.

There are several possible reasons why low performers are more heavily segregated in particular schools in some countries, as opposed to being spread out in a variety of schools. For example, institutional arrangements of the educational system, such as the timing and intensity of curricular differentiation (e.g. vocational and academic programmes) can lead to greater segregation (Oakes, 2005; LeTendre et al, 2003; Van de Werfhorst and Mijs, 2010). Greater school segregation can also be the result of parents' and schools' decisions in systems that grant more options for families to choose their children's schools and for schools to select their students based on achievement or other criteria (OECD, 2012a; Forsey et al, 2008; Chakrabarti and Peterson, 2008; Mizala and Torche, 2012). Greater school segregation can also be caused by factors unrelated to education, such as residential segregation (Orfield et al., 2003).

Because PISA focuses on 15-year-olds, who may be in different grades, cross-country differences in the concentration of low performers in schools may also be due to the timing of students' progress through the school system. For example, in Sweden and other Nordic countries, pupils'

age at entry to primary school is relatively late, and most students who participate in PISA are still in lower secondary school and have not yet been sorted into programmes with different curricula. This may partly explain why these countries show smaller variations in performance between schools. By contrast, in Japan, Korea and Turkey, most students who participate in PISA are in upper secondary school, where this type of curricular sorting has already occurred.

A high incidence of segregation by educational achievement, combined with larger shares of low-performing students, lead to schools where most students are low performers. Figure 4.3 shows the percentage of students who attend schools where 30% or more, 50% or more, or 80% or more of students in the school are low performers in mathematics. On average across OECD countries, about 15% of students attend schools where at least one in two students score only at or below Level 1 in mathematics; and 4% of students attend schools where at least four out of five students in the school perform at this level. In Albania, Colombia, Indonesia, Jordan and Peru, at least 80% of students attend schools where at least one in two students are low performers. These are countries that also have very large proportions of low performers. By contrast, in Canada, Estonia, Finland, Hong Kong-China, Korea, Macao-China, Poland, Shanghai-China, Singapore and Switzerland, only 2% or less of students attend schools where the majority of students are low performers.

Across OECD countries, an average of 23% of students are low performers in mathematics. More than one in three students in Greece, Hungary, Israel, Italy, Luxembourg, the Slovak Republic, Sweden and the United States attend schools where at least 30% of students are low performers in mathematics; in Chile, Mexico and Turkey, more than two out of three students attend such schools.

The socio-economic profile of schools

Students learn not only from teachers, but also from their peers. If most of their schoolmates are low performers and socio-economically disadvantaged, students may have a more difficult time learning, as not all teachers are adequately trained to handle high concentrations of such students. PISA 2012 found that more than half of the variation in mathematics scores between schools was associated with the socio-economic profile of the school (OECD, 2013b).

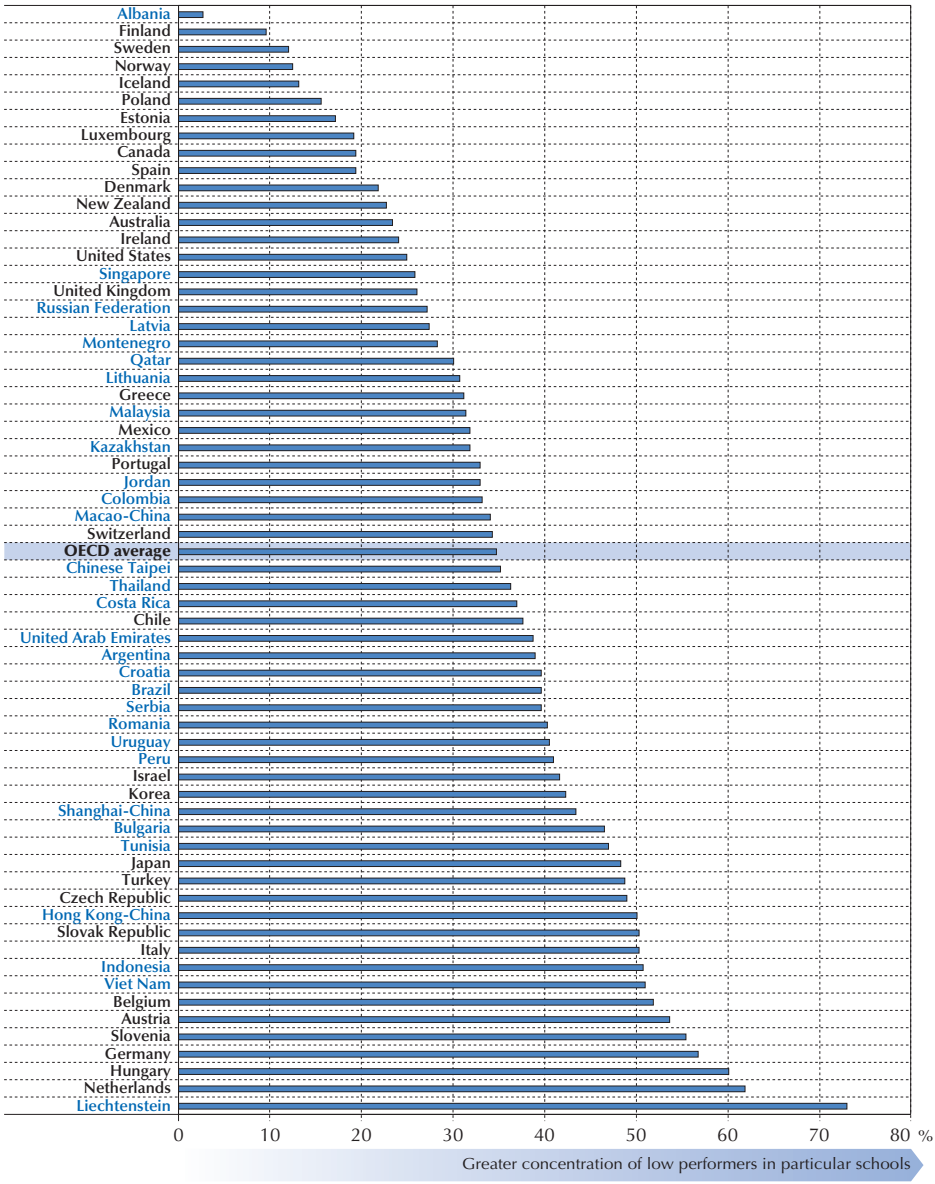
In every country and economy that participated in PISA 2012, low-performing students attended schools with a more disadvantaged student body than students who scored above the baseline level of proficiency in mathematics. On average across OECD countries in 2012, low-performing students attended schools with an average socio-economic profile of -0.3 on the *PISA index of economic, social and cultural status* (ESCS), while students who scored at proficiency Level 2 or above attended schools with an average socio-economic profile of 0.1 on the index (the difference of -0.4 index point is statistically significant). In Brazil, Chile, Hungary and Peru, the difference between the socio-economic profiles of the schools attended by these two groups of students is equal to or greater than -0.7 point. By contrast, in Finland and Norway, the difference is only -0.1 point (Table 4.3).

The correlation between schools that are more disadvantaged (i.e. a school at the bottom quarter of the ESCS index) and larger shares of low performers in these schools is strong and statistically significant in all countries and economies that participated in PISA 2012 (Table 4.4).

■ Figure 4.2 ■

Between-school variation in low performance in mathematics

Percentage of variation in low performance in mathematics explained by differences between schools



Countries and economies are ranked in ascending order of the percentage of variation in low performance in mathematics explained by differences between schools.

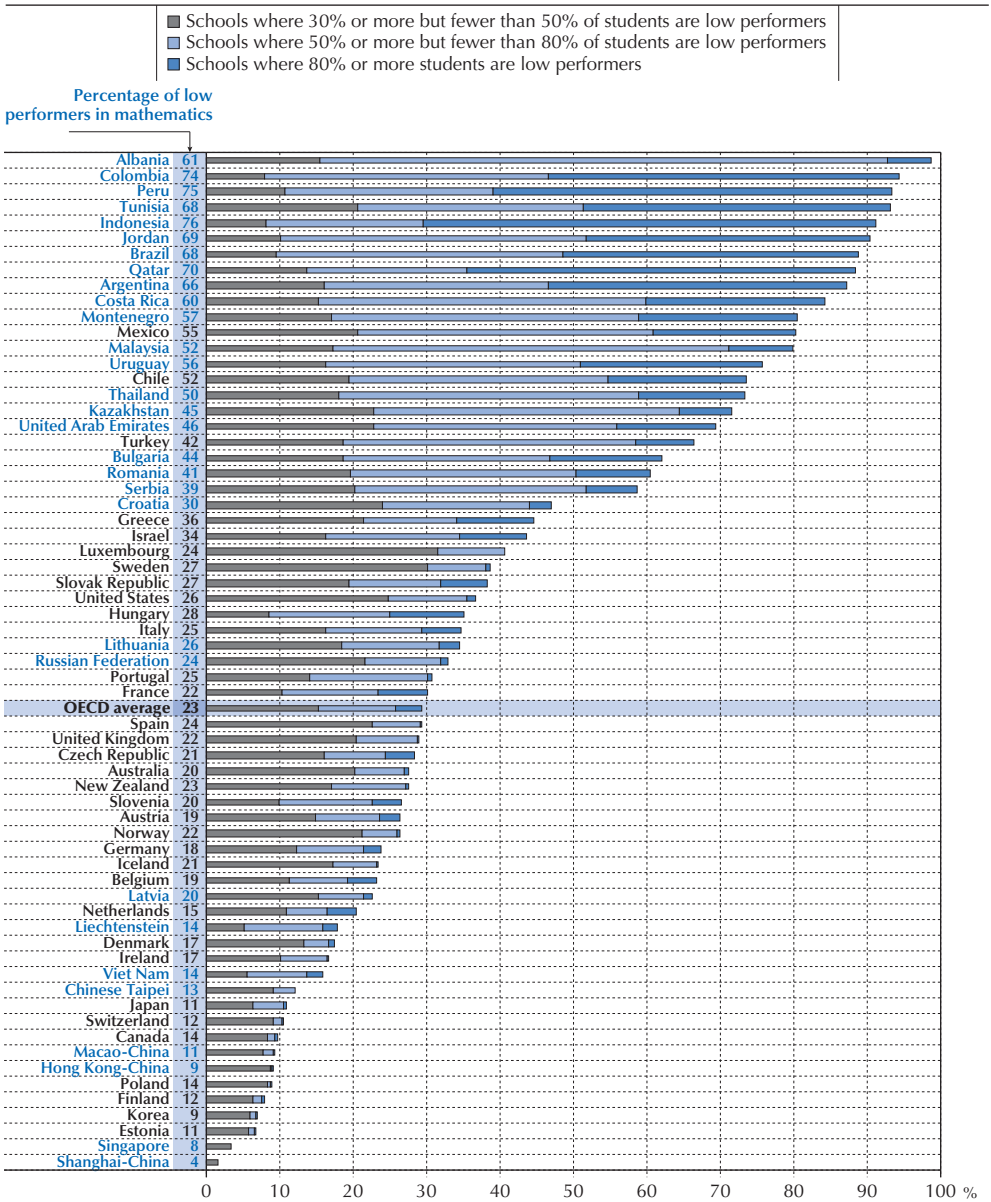
Source: OECD, PISA 2012 Database, Table 4.1.

StatLink http://dx.doi.org/10.1787/888933315659

■ Figure 4.3 ■

Schools' share of low performers

Percentage of students who attend schools where 30% or more, 50% or more, or 80% or more of students are low performers in mathematics



Countries and economies are ranked in descending order of the percentage of students who are in schools where 30% or more of students are low performers in mathematics.

Source: OECD, PISA 2012 Database, Table 4.2.

StatLink http://dx.doi.org/10.1787/888933315665

Figure 4.4 shows the average socio-economic profile of the schools attended by students at different levels of mathematics proficiency. In every country and economy that participated in PISA 2012, students with greater proficiency in mathematics attended more advantaged schools.

Some of the differences shown in Figure 4.4 are related to schools' socio-economic profile and some are related to the background of individual students. On average across OECD countries, a student who attends a disadvantaged school is 17 times more likely to be a low performer in mathematics than a student who attends a school with an advantaged student body (i.e. a school in the top quarter of the ESCS index). After the student's socio-economic status is taken into account, the student in the disadvantaged school is 11 times more likely to be a low performer. This means that while a student's own background has a significant influence on the likelihood of his or her being a low achiever in mathematics, the school's socio-economic profile has an even stronger impact (Table 4.5).

THE LEARNING ENVIRONMENT IN SCHOOLS

School leadership

Recent research has highlighted the key role of school leaders in education (Leithwood et al., 2006; Pont, Nusche and Moorman, 2008; Barber, Whelan and Clark, 2010). The most effective schools are led by individuals who set and communicate clear goals and define plans of action according to those goals, including specific tasks for teachers and all actors in the school community. Effective school leaders promote a positive school climate, collaboration among teachers, and teachers' professional development that is adapted to students' learning needs. These leaders welcome and encourage teacher participation in school decisions, and create ways to involve parents in school life. Through all of these practices, effective leaders set high expectations for student achievement while nurturing students' well-being, and are particularly supportive of struggling students. Often, school principals are also responsible for deciding how the school is organised and how education is provided, such as whether to group students by ability or how to address student heterogeneity within classrooms.

Expectations for students

Schools leaders and teachers sometimes respond to low-performing students by lowering their expectations for these students and even reducing the scope of the curriculum these students are taught. However, this type of response can turn into a self-fulfilling prophecy, whereby lower expectations lead to poorer performance (Eder, 1981; Rist, 1970). School principals and teachers with leadership roles can promote, develop and sustain a culture in schools where academic success is expected of all students, including those from disadvantaged backgrounds and those who have performed poorly in previous years.

PISA 2012 asked school principals whether teachers' low expectations for their students hinder learning in their school. On average across OECD countries, 15% of students attend schools whose principals reported that low expectations hinder student learning "a lot" or "to some extent". Low performers are more often found in schools where teachers' low expectations for their students are more prevalent than in schools where teachers' low expectations for students are rare. Some 31% of students who attend schools where teachers have low expectations for

their students are low performers, compared to 22% of students who attend schools where teachers' low expectations are not identified as an issue. This difference is observed in 34 out of the 62 countries and economies with available data. Only in Macao-China is the share of low performers significantly smaller in schools whose principals reported that teachers have low expectations for their students (see Table 4.6 for variations across countries).

Teachers' expectations are strongly linked to the socio-economic profiles of schools and students. In nine countries that participated in PISA 2012, the relationship between teachers' low expectations and student low performance in mathematics is statistically significant even after accounting for the socio-economic status of students and schools. Figure 4.5 shows that on average across OECD countries, and before adjusting for socio-economic variables, students enrolled in schools whose principals reported that teachers have low expectations for their students are 1.71 times more likely to score below proficiency Level 2 in mathematics, compared with students in schools where teachers have higher expectations for them. After accounting for socio-economic status, students in schools where teachers have low expectations are 1.2 times more likely to perform poorly in mathematics.

The relationship between teachers' expectations and low performance in mathematics is particularly strong in Chile, Indonesia, Korea and Qatar, where the odds of low performance among students in schools whose principals reported that teachers' low expectations hinder learning are at least 1.5 times higher than in schools where teachers have greater expectations for students. However, in the majority of countries and economies that participated in PISA 2012, the relationship between teachers' expectations and low performance is not significant after accounting for socio-economic status. This indicates the great degree to which students' and schools' socio-economic disadvantage affects teachers' expectations for students' performance. After accounting for socio-economic status, only Macao-China shows significantly higher odds of low performance among students who attend schools where school principals reported that teachers have low expectations for their students.

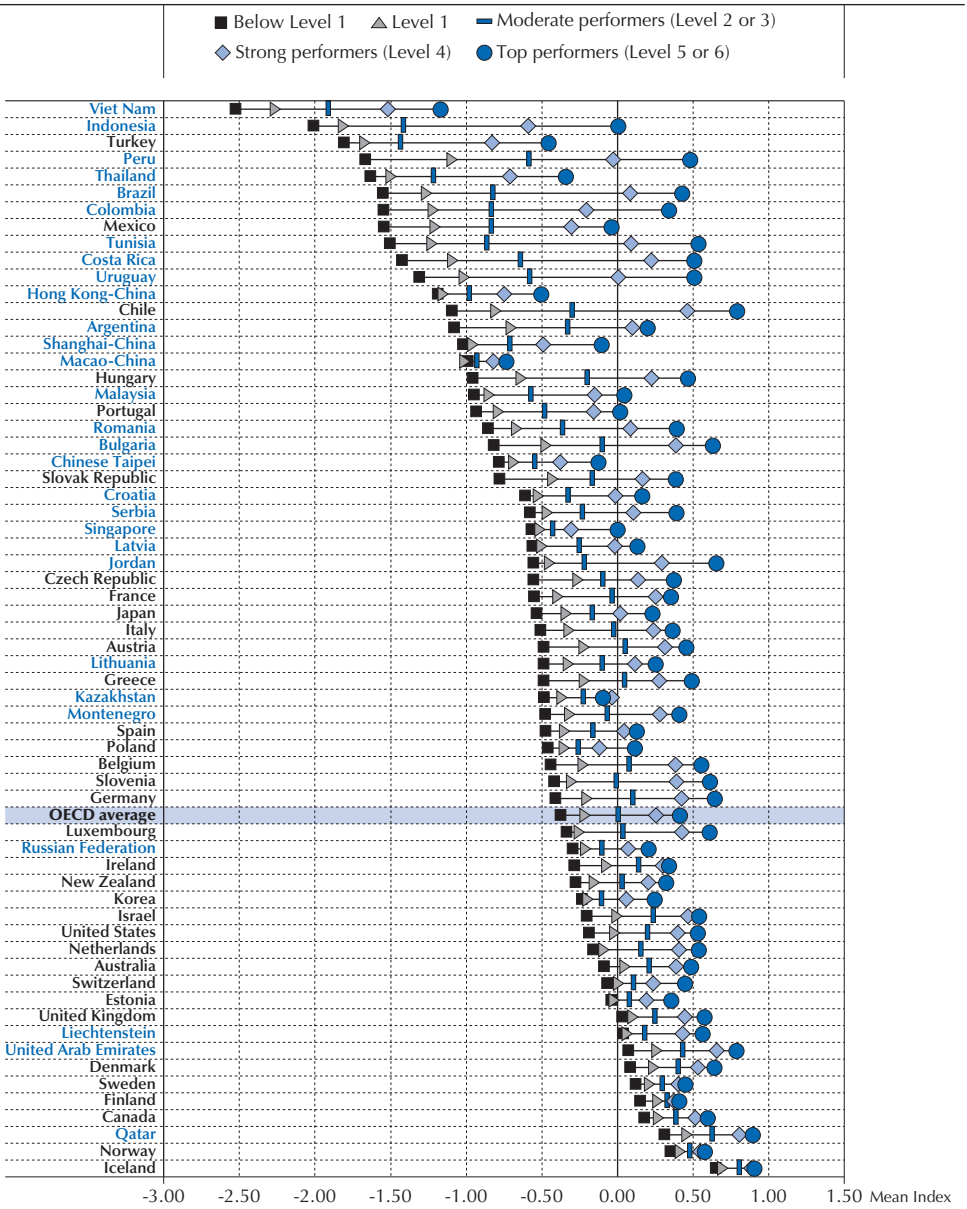
Ability grouping

Nearly all schools have to decide how to handle diversity in students' learning abilities and interests. Some schools mix students of all levels of performance into the same classrooms and teach them the same curriculum. This approach relies heavily on teachers' capacity to engage students with a wide range of abilities, which can be challenging, but can create greater opportunities for students to learn from one another. Other schools sort their lowest-performing and highest-performing students into different classrooms, and offer them different curricula or the same curricula, but at different levels of difficulty ("ability grouping"). While grouping by ability creates more homogeneous classes, students in lower-ability groups often do not benefit as much as those in the higher-ability groups, partly because underachieving students cannot learn from or be inspired by higher-performing peers if they aren't sitting in the same classroom (Lucas, 1999). Many schools use a mix of the two approaches and sort students into different classrooms or ability groups in only some subjects. On average across OECD countries, 26% of students attend schools whose principal reported that ability grouping is not used in any classes, 40% of students attend schools where ability grouping is used for some classes, and 34% of students attend schools with some ability grouping in all classes (Table 4.8).

■ Figure 4.4 ■

Socio-economic profile of schools by proficiency levels in mathematics

Schools' mean value on the PISA index of economic, social and cultural status



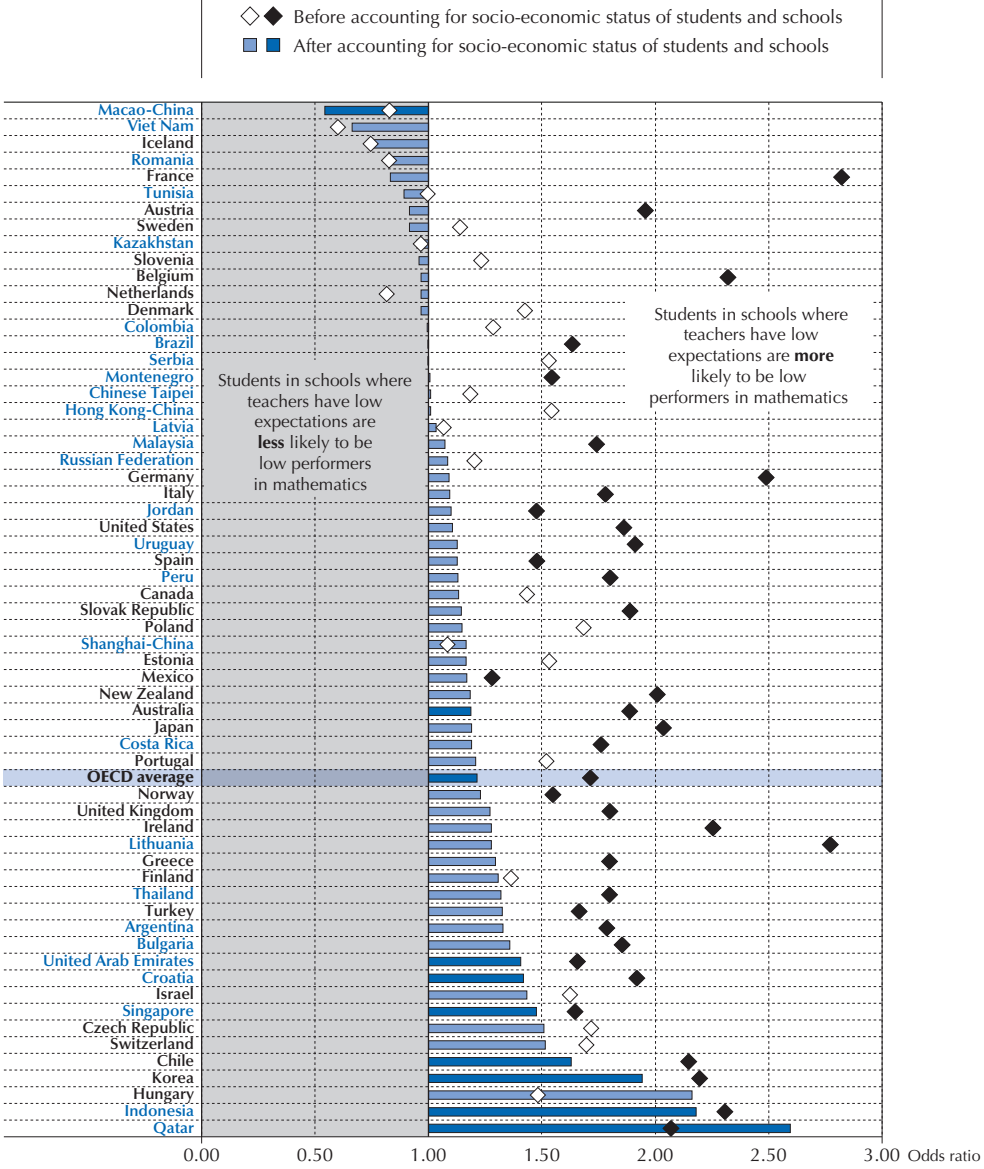
Countries and economies are ranked in ascending order of the mean PISA index of economic, social and cultural status *(ESCS) of the schools attended by students who score below Level 1 in mathematics.*

Source: OECD, PISA 2012 Database, Table 4.4.

StatLink http://dx.doi.org/10.1787/888933315678

■ Figure 4.5 ■

Teachers' expectations and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend schools whose principals reported that teachers' low expectations for students hinder student learning a lot or to some extent, compared with students who attend schools whose principals reported that teachers' low expectations hinder student learning very little or not at all, after accounting for students' and schools' socio-economic status.

Source: OECD, PISA 2012 Database, Table 4.7.

StatLink http://dx.doi.org/10.1787/888933315687

The proportion of low performers is larger in schools with more ability grouping. On average across OECD countries, 20% of students in schools with no ability grouping in any class are low performers, while in schools with ability grouping in some classes, 24% of students are low performers, and in schools with ability grouping in all classes, 26% of students are low performers (Table 4.8). In 15 countries and economies that participated in PISA 2012, the difference in the share of low performers between schools with ability grouping for all classes and schools with no ability grouping is 10 percentage points or larger. In Austria, the share of low performers is 33 percentage points larger in schools with ability grouping in all classes than in schools with no ability grouping in any class. In Montenegro the difference in the shares of low performers between the two types of schools is 22 percentage points, and in Turkey it is 20 percentage points.

Figure 4.6 shows that the relationship between ability grouping in mathematics (as measured by the *index of ability grouping between mathematics classes*[1]) and low performance in mathematics persists even after accounting for the socio-economic status of students and schools. Before accounting for these factors, students who attend schools with more ability grouping are 1.24 times more likely to score below Level 2 in mathematics than students in schools with less ability grouping, on average across OECD countries. After accounting for the socio-economic status of students and schools, students in schools with more ability grouping are 1.13 times more likely to perform below Level 2, on average across OECD countries. In Austria, Greece, Italy, Luxembourg, Macao-China, Montenegro, the Netherlands, Switzerland and Turkey, the relationship between ability grouping and a greater likelihood of low performance is statistically significant even after accounting for socio-economic factors. These findings suggest that part, but not all, of the association between ability grouping and low performance can be explained by the fact that ability grouping is more common in schools with more disadvantaged student bodies.

The issues involved in deciding how to handle student diversity within a school are analogous to those faced by policy makers when deciding whether policies should encourage the sorting of low performers and top performers into different schools, curricular tracks or grade levels (e.g. through academically selective and vocational schools, grade repetition). Countries with policies that promote and foster more academically inclusive schools expect schools to find ways to handle student heterogeneity. These issues are further explored in Chapter 5, where low performance is analysed in the context of vertical and horizontal stratification in school systems.

Teachers' practices

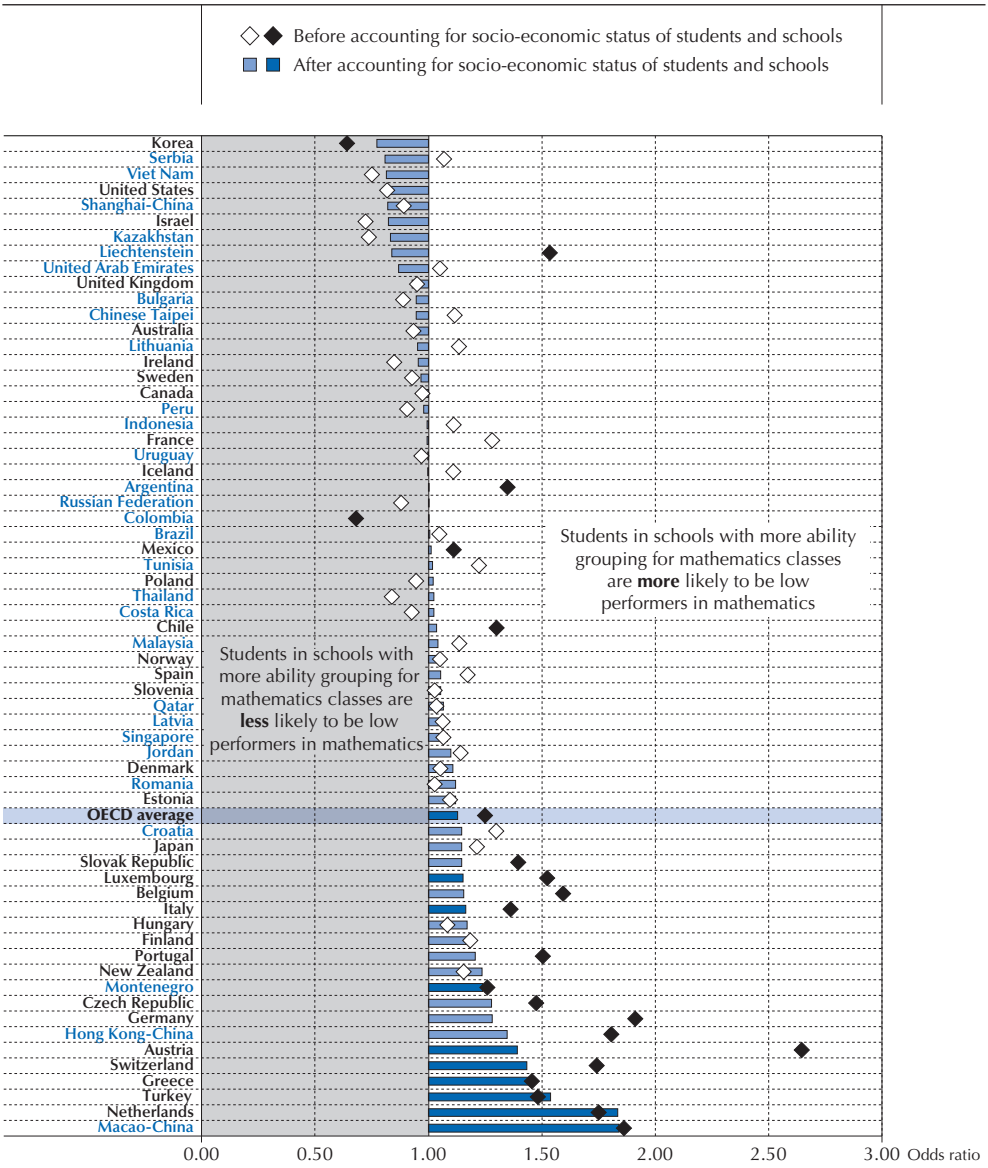
Previous studies have identified certain teaching practices, including planning lessons, using formative assessments, encouraging student participation and providing early support for struggling students, as being particularly effective for learning (Hopkins et al., 2014). PISA finds that some teachers' practices that are related to a positive school climate, such as better teacher morale, teachers' support for students, and no teacher absenteeism, are also related to a reduction in the likelihood of low performance among students.

Teachers' support for students

PISA's definition of teachers' support includes showing an interest in every student's learning, giving extra help when students need it, working with students until they understand the material, and giving students an opportunity to express their opinions. The *index of teacher support* measures these practices based on student responses to questions in the student questionnaire.

■ Figure 4.6 ■

Ability grouping for mathematics classes and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend schools with more ability grouping for mathematics classes, compared with students who attend schools with less ability grouping, after accounting for students' and schools' socio-economic status.

Source: OECD, PISA 2012 Database, Table 4.9.

StatLink http://dx.doi.org/10.1787/888933315693

Before accounting for socio-economic factors, there is no clear relationship between low performance and teachers' support, on average across OECD countries. Raw differences in the *index of teacher support* show that in 22 countries and economies that participated in PISA 2012, low performers in mathematics attended schools with more supportive teachers than students who performed at or above baseline Level 2, whereas in 17 countries and economies, low performers attended schools with less supportive teachers (Table 4.10).

Figure 4.7 shows the relationship between teachers' support and low performance after accounting for the socio-economic status of students and schools. On average across OECD countries, students who attend schools with less supportive mathematics teachers are slightly more likely (odds ratio of 1.06) to be low performers in mathematics compared with students of similar socio-economic status who attend schools with a similar socio-economic profile, but where teachers are more supportive. A statistically significant relationship between less teacher support and a greater likelihood of low performance is observed in 19 countries and economies.

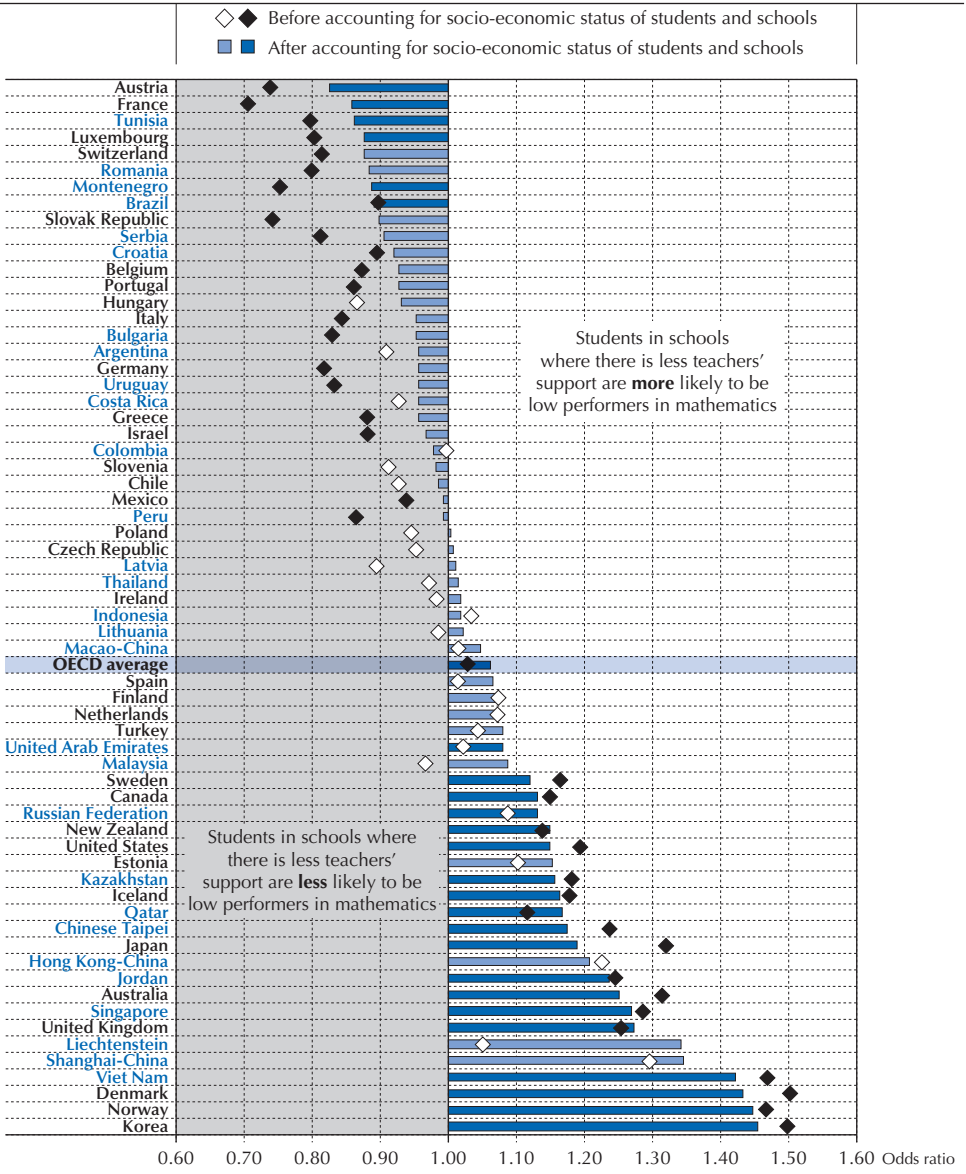
In most of the countries where a link between less teacher support and less low performers is observed, the association is statistically insignificant. However, there are six countries (Austria, Brazil, France, Luxembourg, Montenegro and Tunisia) where students in schools with less supportive teachers are significantly less likely to be low performers in mathematics after accounting for socio-economic factors. This finding suggests that teachers' expectations for their students have a complex interaction with other features of the school system. It could be the case, for example, that in countries where students with different needs are sorted into different schools or ability groups, such as in Austria and France, teachers with more supportive attitudes are more commonly found in academically less-demanding schools, where students are in greater need of support. In countries where students are not necessarily sorted into different schools, such as Korea, teachers have to accommodate students with diverse educational needs, and work with students at risk of failing in order to achieve the education goals that are set for all students. This hypothesis is partly supported by preliminary analyses that show greater between-school variation in teachers' support in Austria and France than in Korea. However, further analysis is required to understand why the effect of teachers' support for students varies so much across countries.

Teacher morale

Teacher morale refers to the degree of enthusiasm with which teachers conduct their work, teachers' pride in their school, and the extent to which teachers value academic achievement. PISA measures teachers' morale in two different ways. First, the school questionnaire asks principals whether the morale of teachers in their schools is high. On average across OECD countries, 91% of students attend schools whose principal agreed or strongly agreed that the morale of teachers is high (Table 4.12). According to this measure, teacher morale is highest in Albania, Indonesia, Latvia, Liechtenstein and Montenegro, where all students attend schools whose principals reported that their teachers enjoy high morale. Teacher morale is lowest in Brazil, Hong Kong-China, Italy, Portugal, Spain and Tunisia, where approximately three out of four students attend schools whose principals reported high teacher morale.

■ Figure 4.7 ■

Teachers' support for students and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend schools where there is less teachers' support for students, after accounting for students' and schools' socio-economic status.

Source: OECD, PISA 2012 Database, Table 4.11.

StatLink http://dx.doi.org/10.1787/888933315705

Second, the *index of teacher morale* is a more comprehensive measure that combines principals' responses to whether they consider that: 1) teacher morale is high; 2) teachers work with enthusiasm; 3) teachers take pride in the school; and 4) teachers value academic achievement. In most countries and economies that participated in PISA 2012, low performers attend schools where teacher morale is lower than in schools where more students perform above the baseline level of proficiency in mathematics (Table 4.12). On average across OECD countries, schools that have a large proportion of low-performing students are 0.19 point lower on the *index of teacher morale*, on average, than schools where most students score at or above proficiency Level 2 in mathematics.

Figure 4.8 illustrates that students who attend schools where teacher morale is lower are more likely to perform poorly in mathematics, compared with students who attend schools where teacher morale is high. This relationship holds even after accounting for the socio-economic status of students and schools. On average across OECD countries, the odds of low performance in mathematics for students attending schools with lower teacher morale are about 1.26 times greater before accounting for socio-economic factors, and remain slightly but significantly higher than 1 (odds ratio of 1.07) after accounting for those factors. In 15 countries and economies, the relationship between lower teacher morale and a greater likelihood of student low performance is statistically significant after accounting for socio-economic status. In no country or economy is high teacher morale significantly related to greater odds of student low performance.

Teacher absenteeism

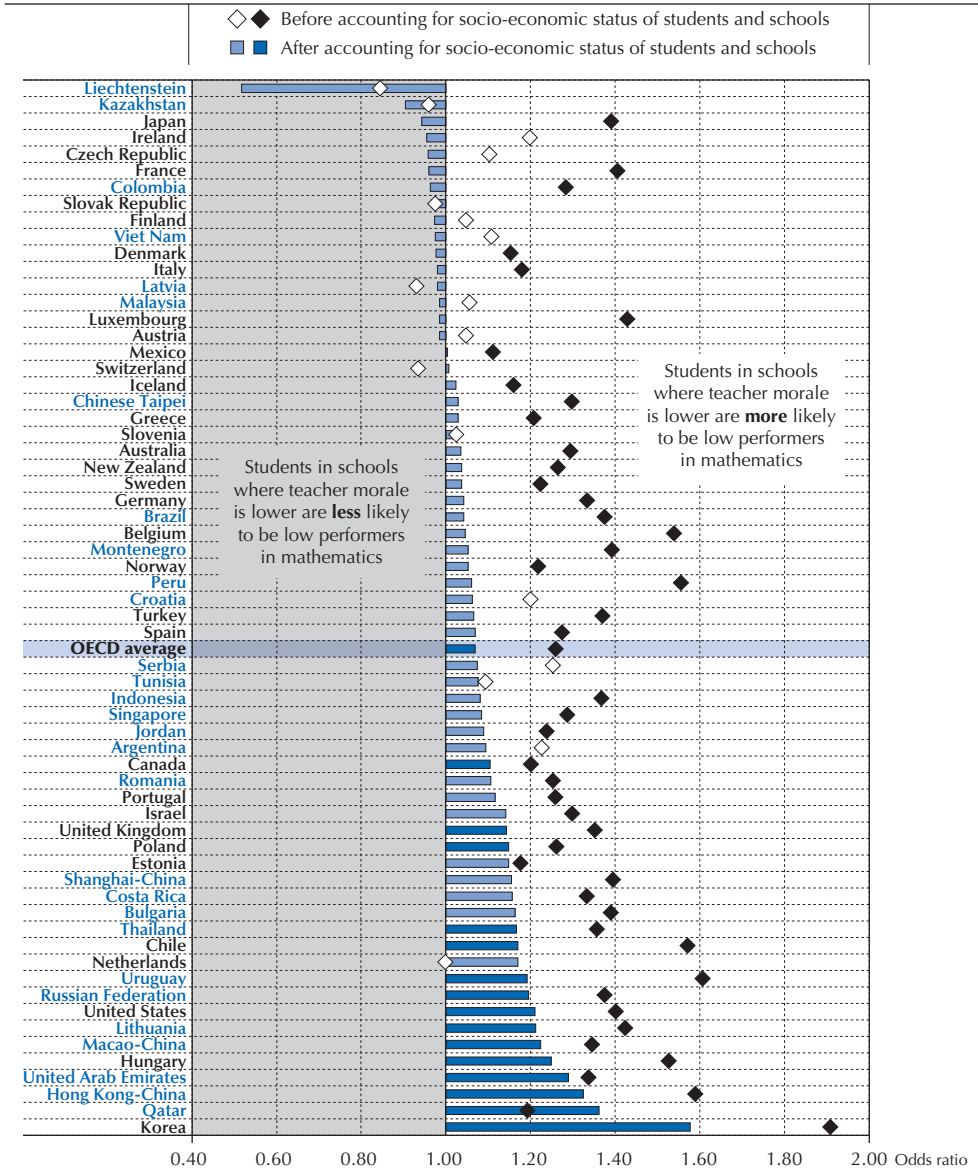
A basic demonstration of teachers' professional responsibility and commitment to students' learning is their showing up for school every day. Teacher absenteeism jeopardises students' opportunities to learn: lessons may be cancelled if no substitute teachers are available, and substitute teachers may not be as well prepared or as effective as regular teachers (Gaziel, 2004; Imants and Van Zoelen, 1995).

PISA 2012 asked school principals whether they considered that teacher absenteeism hindered student learning in their school. On average across OECD countries, 13% of students attend a school whose principals reported that teacher absenteeism hinders learning "a lot" or "to some extent" (Table 4.14). At least 40% of principals in Argentina, Jordan, Kazakhstan, the Netherlands, Tunisia and Uruguay reported that teacher absenteeism hinders learning, while less than 1% of principals in Hungary, Korea and Lithuania so reported.

Schools with larger proportions of low performers tend to suffer more from teacher absenteeism. On average across OECD countries, 28% of low-performing students attend a school whose principal reported that teacher absenteeism hinders student learning, whereas 22% of students who perform below Level 2 in mathematics attend a school where teacher absenteeism hinders learning "very little" or "not at all". The difference in the share of low-performing students between schools where teacher absenteeism hinders student learning and schools where teacher absenteeism is not a problem is equal to or greater than 15 percentage points in Belgium, Portugal, the United Arab Emirates and Uruguay (Table 4.14).

■ Figure 4.8 ■

Teacher morale and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

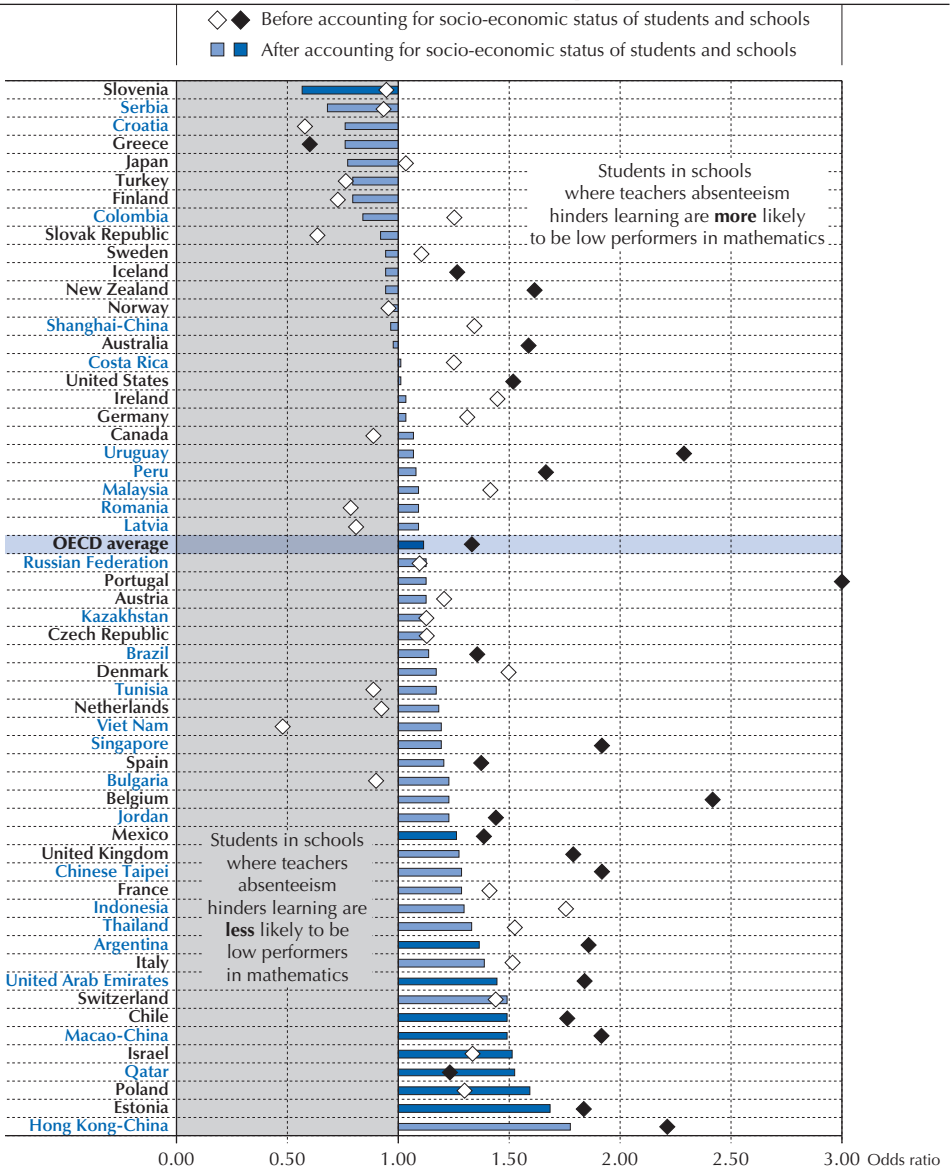
Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend schools with lower values on the index of teacher morale*, after accounting for students' and schools' socio-economic status.*

Source: OECD, PISA 2012 Database, Table 4.13.

StatLink http://dx.doi.org/10.1787/888933315715

■ Figure 4.9 ■

Teacher absenteeism and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

Countries and economies are ranked in ascending order of the odds ratio of low-performance in mathematics of students attending schools where the principal reports that teachers absenteeism hinders learning a lot or to some extent, compared with students attending schools where teacher absenteeism hinders learning very little or not at all, after accounting for students' and schools' socio-economic status.

Source: OECD, PISA 2012 Database, Table 4.15.

StatLink http://dx.doi.org/10.1787/888933315723

Figure 4.9 shows that students who attend schools where teacher absenteeism is a problem have a greater likelihood of low performance in mathematics, compared with students in schools where teacher absenteeism is not a problem, even after socio-economic factors have been taken into account. On average across OECD countries, the odds of low performance in mathematics are 1.36 times higher for students in schools whose principals reported that teacher absenteeism hinders learning, before accounting for socio-economic factors. These odds are 1.12 times higher after socio-economic factors are taken into account, as compared with students in schools where teacher absenteeism is not a problem.

After accounting for the socio-economic status of students and schools, teacher absenteeism is significantly linked to a greater likelihood of low performance in Argentina, Chile, Estonia, Israel, Macao-China, Mexico, Poland, Qatar and the United Arab Emirates.

Box 4.1. Students with special educational needs and low performance: What we can learn from PISA

Students with special educational needs are defined differently across countries. In some countries, their special needs are related to academic ability, from those who are extraordinarily talented to those with poor cognitive skills. In other countries, young people with physical, sensory or behavioural disabilities are included in this population. Other countries may include socio-economically disadvantaged young people who require extra resources, both human and material, to master the curriculum.

PISA classifies special educational needs into three categories. The first comprises students with functional disabilities, i.e. those with a moderate to severe permanent physical disability. The second includes students with cognitive, behavioural or emotional disability, as determined by a test or professional opinion. The third comprises students who have received less than one year of instruction in the language of assessment.

Why consider students with special educational needs in discussions of low performance?

Many students with special educational needs do not reach baseline levels of proficiency in mathematics, reading and science in PISA. While the reasons for low performance are varied, findings from standardised educational assessments may help educators to identify some of the instructional and environmental factors that prevent these students from performing at higher levels.

Public school enrolment of students with special educational needs has been increasing across the world since the 1970s. Education reforms in the 1990s extended access further by encouraging the inclusion of students with special educational needs in mainstream classrooms and programmes. Both access and inclusion vary widely across countries. According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO), young people with disabilities in low-income countries are rarely in school, while in high-income countries they regularly attend school through upper secondary and even into post-secondary institutions (UNESCO, 2014). Many OECD countries require by law that young people with disabilities learn the same curriculum and participate in the same assessments as their peers.

…

However, in some countries, a lack of targeted teacher preparation or adequate facilities makes it difficult to include students with special educational needs in mainstream classes. As a result, too few students with special educational needs leave public education with the skills needed to participate fully in the workforce and public life. More than 60% of young adults with special educational needs are unemployed, and those who are employed often work in low-skilled and low-paying jobs (WHO, 2011). The majority of young adults with moderate to severe special educational needs remain lifelong beneficiaries of public support systems instead of becoming engaged, taxpaying citizens.

Profile of students with special educational needs in PISA

Since PISA 2003, between 1% and 3% of each subsequent PISA sample has been composed of students with special educational needs. While the PISA inclusion rates for this population vary widely across participating countries and economies (between 0% and 15%), the number of countries that include at least some students with special educational needs in their samples has grown each year, from a low of 27 out of 41 countries in 2003 to a high of 58 out of 64 countries in 2012. However, the sample size of these students in PISA is not large enough to conduct separate analyses by country; thus the information in this section refers to the pooled sample of students with special educational needs in PISA.

In 2012, the prototypical PISA participant with special educational needs was a boy (60%, higher than the 50% among students without special educational needs), with a cognitive, behavioural and/or emotional disability (63%; 23% of these students had limitations in language proficiency and 14% had functional limitations), who lived in a two-parent family (80%, lower than the 84% among students without special educational needs) with well-educated parents (74% of these students' parents completed post-secondary degrees, similar to the parents of students without special educational needs) and who work full time (47%, also similar to students without these special needs). This profile has been consistent across the PISA cycles from 2003 through 2012.

Compared to students without special educational needs, students with these needs report that their classes are smaller (23 students versus 29 students). Some 40% of these classes use ability grouping for instruction and focus more on concrete as opposed to abstract academic concepts. Students with special educational needs report similar amounts of time spent studying and doing homework (four hours per week, on average) as their peers; and they report significantly greater access, familiarity and use of computers and instructional technology at home and in school. These characteristics of student learning environments have been consistent across the PISA cycles.

Performance in PISA among students with special educational needs

The mean scores for students with special educational needs, across academic subjects (mathematics, reading and science), the three categories of students with special educational needs and the four PISA assessment cycles, have been less than 425 points. As a group, students with special educational needs (those in OECD countries only, and all of these students in PISA-participating countries and economies combined) score lower than the OECD average by the equivalent of a year of formal schooling. As shown in the figure hereafter, the majority of students with special educational needs scored at proficiency Level 1 or below in the PISA 2012 mathematics assessment.

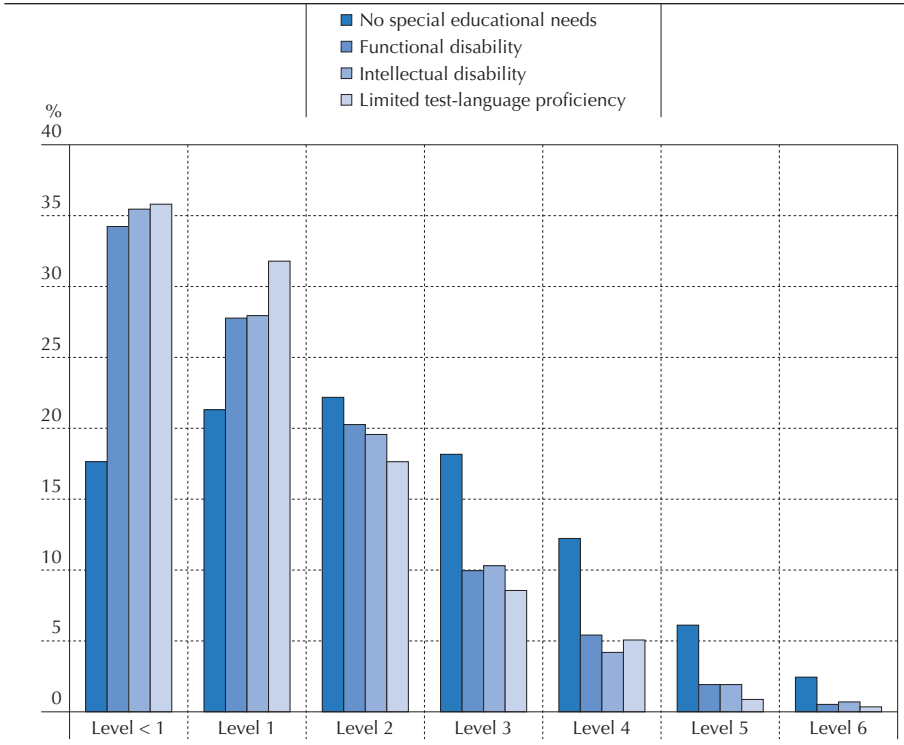
…

Students with special educational needs also have less positive attitudes towards learning and school than their peers. They report feeling less connected to their classmates and learning environments, and are less happy and less convinced that school will matter for their life outcomes than their peers.

While there is no implied causal relationship among performance, attitudes towards learning and special educational needs, these three phenomena are often related.

■ Figure 4.a ■

Special education and needs, by proficiency levels of mathematics



Source: OECD (forthcoming).

The number of students with special educational needs in PISA is steadily rising; but given that these students are unevenly distributed across countries and the sample sizes within countries are small, the use of these data for examining the performance of students with special educational needs is limited. A forthcoming study, *PISA 2012 and the Participation of Students with Special Educational Needs*, will focus on these issues.

Sources:

UNESCO (2014), *Education for All: Global Monitoring Report*, United Nations Educational, Scientific and Cultural Organisation, Paris.

WHO (2011), *World Report on Disability*, World Health Organisation, Geneva.

…

For more information:

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Extracurricular opportunities after school hours

Students' school life does not always end when the final school bell rings. Many schools offer extracurricular activities, some with an academic focus and some centred on enrichment activities, such as music and arts. Extracurricular activities focused on academic subjects can help to improve student achievement directly by extending learning time or by providing more personalised instruction for struggling or gifted students. Participation in non-academic extracurricular activities, such as sport teams, music groups or volunteering, can help to develop non-cognitive skills, such as persistence, working in groups and socialisation, which are also important for school success (Farb and Matjasko, 2012). Since extracurricular activities involve additional resources, they are more frequently found in socio-economically advantaged schools. Some research finds that extracurricular activities could thus play a role in perpetuating inequalities in education related to socio-economic status (Covay and Carbonaro, 2010; Lareau, 2003).

Schools that offer remedial and enrichment mathematical lessons and other mathematics-related extracurricular activities

Chapter 3 discussed the extent to which low performers participate in activities related to mathematics after school hours and showed that low performers participate in some of these activities as often as better-performing students (Figures 3.5 and 3.6). But to what extent are low performers attending schools that offer these activities? And how is the availability (or lack) of mathematics-related extracurricular activities at school linked to low performance?

On average across OECD countries, 66% of students attend schools that offer mathematics lessons outside of normal school hours. Of the students who attend schools that offer additional mathematics lessons, more than one in two attend schools where these lessons are organised for both enrichment and remedial purposes (54%), about one in three attends schools where the purpose of these lessons is remedial only (32%), and less than one in ten attends schools where additional lessons are organised for enrichment purposes only (6%) or for reasons unrelated to achievement (7%) (Table 4.16).

Across OECD countries, 25% of students who attend schools that offer some kind of additional mathematics lessons are low performers, while 22% of students who attend schools that do not offer additional mathematics lessons are. This difference of 3 percentage points is statistically significant (Table 4.16).

Low performers are fairly evenly distributed across schools that offer different kinds of after-school lessons. On average across OECD countries, in schools that offer additional mathematics lessons for remedial purposes only, 24% of students are low performers; in schools that offer additional mathematics lessons for both enrichment and remedial purposes, 21% of students are low performers; and in schools that offer additional lessons unrelated to previous performance, 24% of students are low performers. Among schools that offer additional mathematics lessons for enrichment purposes only, 26% of students are low achievers (Table 4.16). These numbers suggest that in many schools, the after-school mathematics lessons are not particularly tailored to the needs of low-performing students.

The *index of mathematics-related extracurricular activities at school* is a composite measure of the availability of different kinds of additional mathematics lessons at school and of other mathematics-related extracurricular activities, such as mathematics clubs and competitions, and clubs focusing on computers and information and communication technologies. Figure 4.10 shows the relationship between students' low performance and schools' mathematics-related extracurricular activities, before and after accounting for the socio-economic status of students and schools. The figure shows that, on average across OECD countries, students who attend schools with fewer mathematics-related extracurricular activities are significantly more likely to perform below baseline proficiency Level 2 in mathematics, both before and after accounting for these socio-economic factors. Before accounting for these factors, this relationship is observed in 38 out of the 64 countries and economies that participated in PISA 2012. After accounting for them, the relationship is still significant in 15 countries and economies.

The fact that low performers participate as much as better-performing students in mathematics-related activities, despite the fact that they are more likely to attend schools that have fewer of these opportunities, suggests that low performers could greatly benefit if more of these activities were available in their schools.

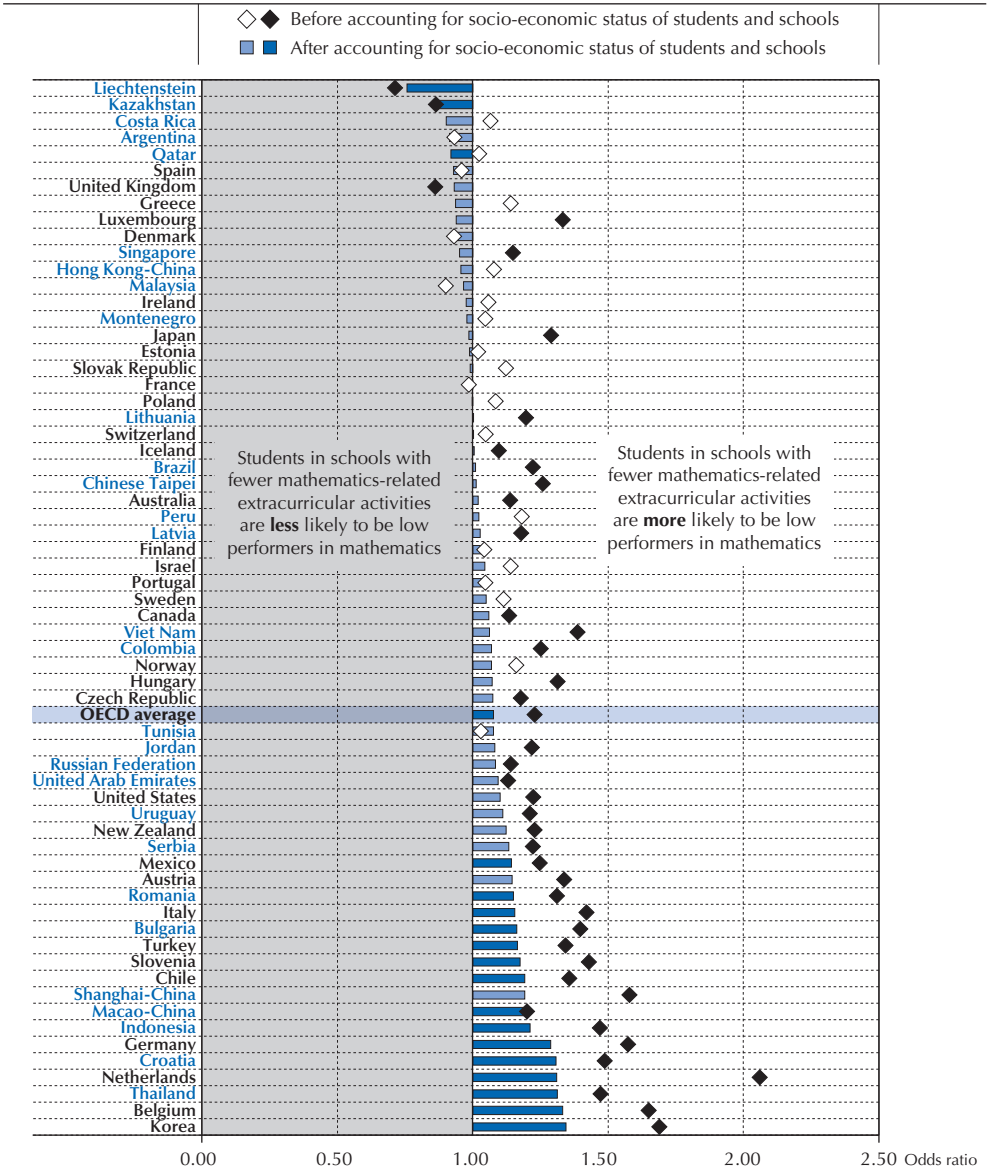
Schools that offer creative extracurricular activities

PISA asked school principals if their schools offer the following creative extracurricular activities: a band, orchestra or choir; a school play or school musical; and an art club or art activities. This information was used to create the *index of creative extracurricular activities*. As discussed in Chapter 3, creative activities may help students to feel a stronger sense of belonging at school.

Figure 4.11 shows that less availability of creative activities after school hours is significantly related to greater chances of poor performance in mathematics among students. Before accounting for other variables, students who attend schools that offer fewer creative extracurricular activities show greater chances of low performance in 45 countries and economies that participated in PISA 2012. After accounting for socio-economic factors, the relationship is still significant among 15 countries and economies. The association between fewer creative extracurricular activities and low performance, after accounting for socio-economic factors, is particularly strong in Indonesia, Korea, Macao-China, Qatar, the United Arab Emirates and the United States.

■ Figure 4.10 ■

Mathematics-related extracurricular activities at school and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

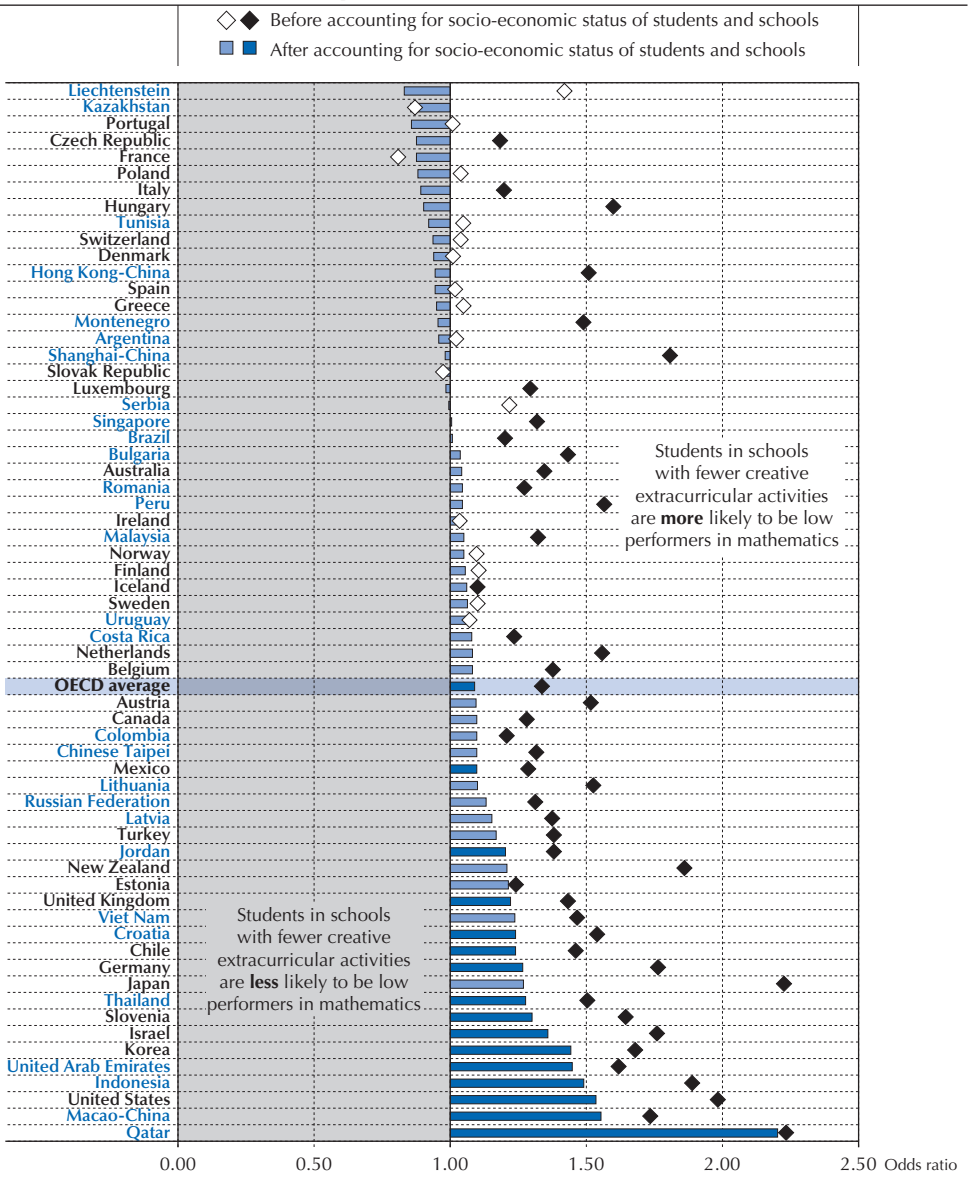
Countries and economies are ranked in ascending order of the odds ratio of low performance among students who attend schools with fewer mathematics-related extracurricular activities, after accounting for students' and schools' socio-economic status.

Source: OECD, PISA 2012 Database, Table 4.17.

StatLink http://dx.doi.org/10.1787/888933315733

■ Figure 4.11 ■

Creative extracurricular activities and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend schools with fewer creative extracurricular activities, after accounting for students' and schools' socio-economic status.

Source: OECD, PISA 2012 Database, Table 4.19.

StatLink http://dx.doi.org/10.1787/888933315740

Parental pressure

Parents can be a great source of support for struggling students (Rumberger, 1995; OECD, 2012b). Parents can not only invest time to help their child with schoolwork or invest financial resources in educational materials, private tutors or private schools, but they can also discuss their expectations for their child's education directly with principals and teachers. PISA examined this type of parental involvement by asking school principals whether they receive pressure from many parents to achieve higher academic standards, pressure from a minority of parents, or whether they received little or no pressure from parents. On average across OECD countries, 46% of students attend schools whose principal reported that a minority of parents exerted pressure, 33% attend schools where there is little or no parental pressure, and 21% attend schools where parents exercise constant pressure (Table 4.20).

In most countries and economies that participated in PISA 2012, the share of low-performing students is larger in schools where parental pressure is weaker. On average across OECD countries, 29% of students in schools where there is little or no parental pressure are low performers, 24% of students in schools where pressure comes from a minority of parents are low performers, and 15% of students in schools where parental pressure is constant are low performers (Table 4.20).

Since research shows that socio-economically advantaged parents may be better positioned to exert pressure on schools (Lareau, 2000), it is important to determine the degree of influence socio-economic status has on the relationship between parental pressure and student performance. Figure 4.12 shows that weaker parental pressure is associated with a greater likelihood of low performance before and after accounting for the socio-economic status of students and schools. Students who attend schools whose principals reported less parental pressure are 1.62 times more likely, before accounting for socio-economic factors, and 1.11 times more likely, after accounting for these factors, to be low performers in mathematics, compared with students who attend schools where greater parental pressure is reported. After accounting for socio-economic factors, less parental pressure is associated with a greater likelihood of low performance in nine countries.

SCHOOL RESOURCES AND ADMINISTRATION

Quality of schools' educational resources

Previous PISA reports have shown that high-quality material resources in a school, including textbooks and infrastructure, are a necessary precondition for high student performance, but are not sufficient in themselves to ensure academic achievement. The relationship between schools' educational resources and student mathematics performance in PISA is significant. On average across OECD countries, higher-performing students generally attend schools with better educational resources. This relationship weakens after accounting for other student and school characteristics, remaining significant in only three countries – Costa Rica, Qatar and Romania (OECD, 2013a).

The quality of educational resources tends to be lower (a mean value of -0.03 on the *index of quality of schools' educational resources*) in schools with a large proportion of low performers

than in schools with a large proportion of students who perform at or above baseline proficiency Level 2 in mathematics (a mean value of 0.09 on the index), on average across OECD countries (Table 4.22). In no country or economy that participated in PISA 2012 did large proportions of low performers attend schools with better educational resources. Most of differences in student low performance related to the quality of schools' educational resources are linked to students' socio-economic status. As shown in Figure 4.13, before accounting for socio-economic factors, in 26 countries and economies the odds of low performance are higher for students in schools with lower-quality educational resources; after accounting for those factors, the likelihood of low performance in mathematics is significantly greater for students in schools with lower-quality resources in nine countries.

Teacher shortage

Teachers are the most valuable resource available in schools, and low-performing students need qualified teachers to help them to improve. PISA finds that low performers in mathematics are more likely than students who perform at or above baseline Level 2 to attend schools that suffer from a lack of qualified teachers. The *index of teacher shortage* measures whether, according to school principals, a lack of qualified teachers hinders instruction in mathematics, science, the language-of-instruction and/or other subjects. Higher values on the index indicate a greater incidence of teacher shortage. On average across OECD countries, the incidence of teacher shortage in the schools attended by low-performing students is 0.13 index point higher than in the schools attended by students who are proficient at or above Level 2. This difference is particularly large (greater than 0.40 index point) in Germany, Indonesia, Liechtenstein, Qatar and Chinese Taipei (Table 4.24).

Differences in teacher shortage are partly explained by socio-economic differences among schools. Figure 4.14 shows that before accounting for the socio-economic status of students and schools, the probability of low performance in mathematics is 23% greater (odds ratio of 1.23) for students who attend schools with a higher incidence of teacher shortage, on average across OECD countries. After accounting for socio-economic factors, the probability is 7% greater, compared with students who attend schools where there is less incidence of teacher shortage.

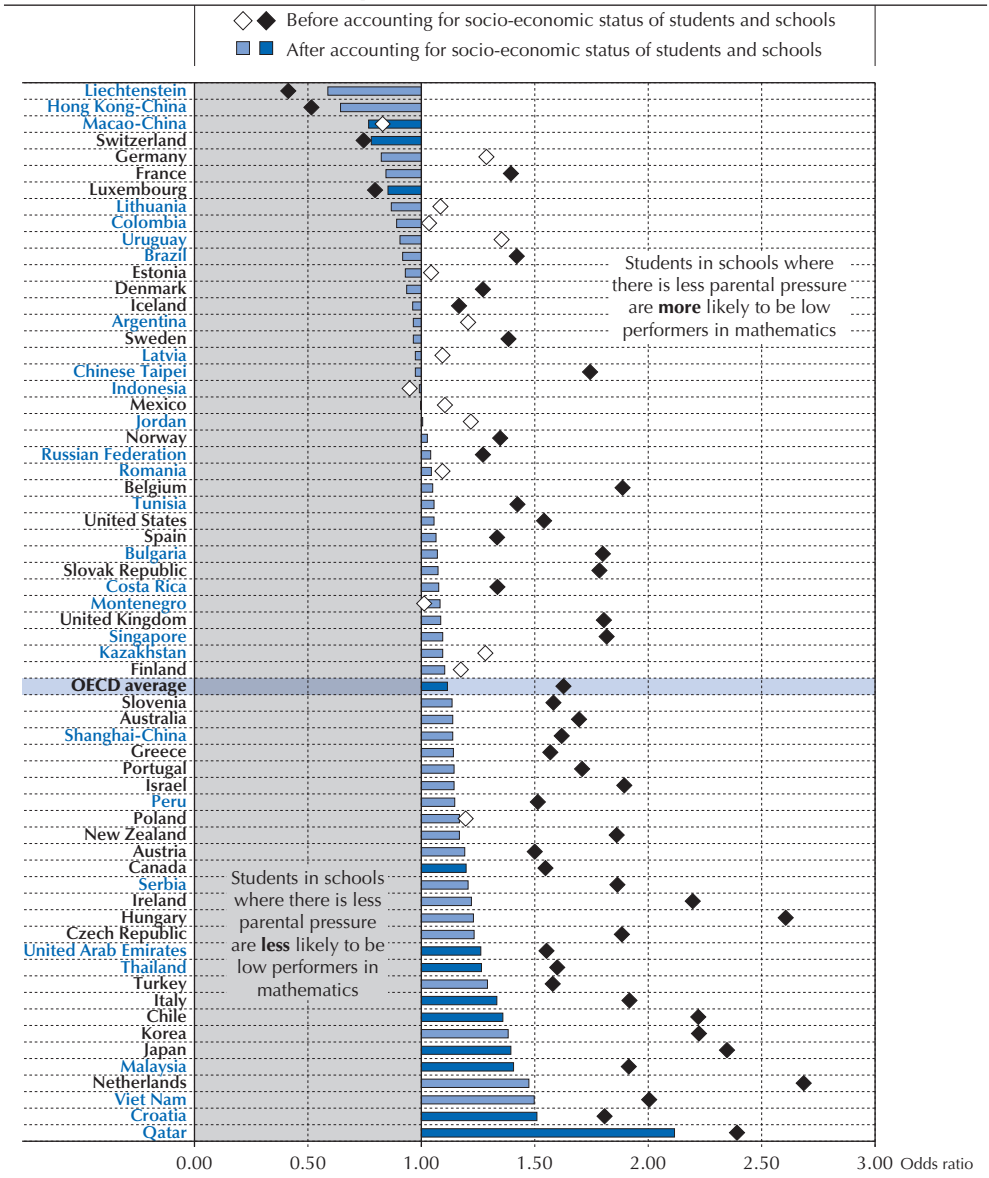
The greater odds of low performance in mathematics associated with teacher shortage are significant in 24 countries, and particularly large in the Czech Republic, Germany, Indonesia, Liechtenstein, Serbia and the Slovak Republic, before accounting for socio-economic status. The odds are greater in eleven countries and economies after accounting for socio-economic factors.

Public vs. private schools

Previous PISA reports have found that in most countries, students who attend private schools perform better than students who attend public schools. However, part or all of these performance differences are accounted for by the socio-economic status of students and/or schools (OECD, 2013a; OECD, 2012a). Little is known about the differences – if any – in the way public and private schools deal with low-performing students.

■ Figure 4.12 ■

Parental pressure for high achievement and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

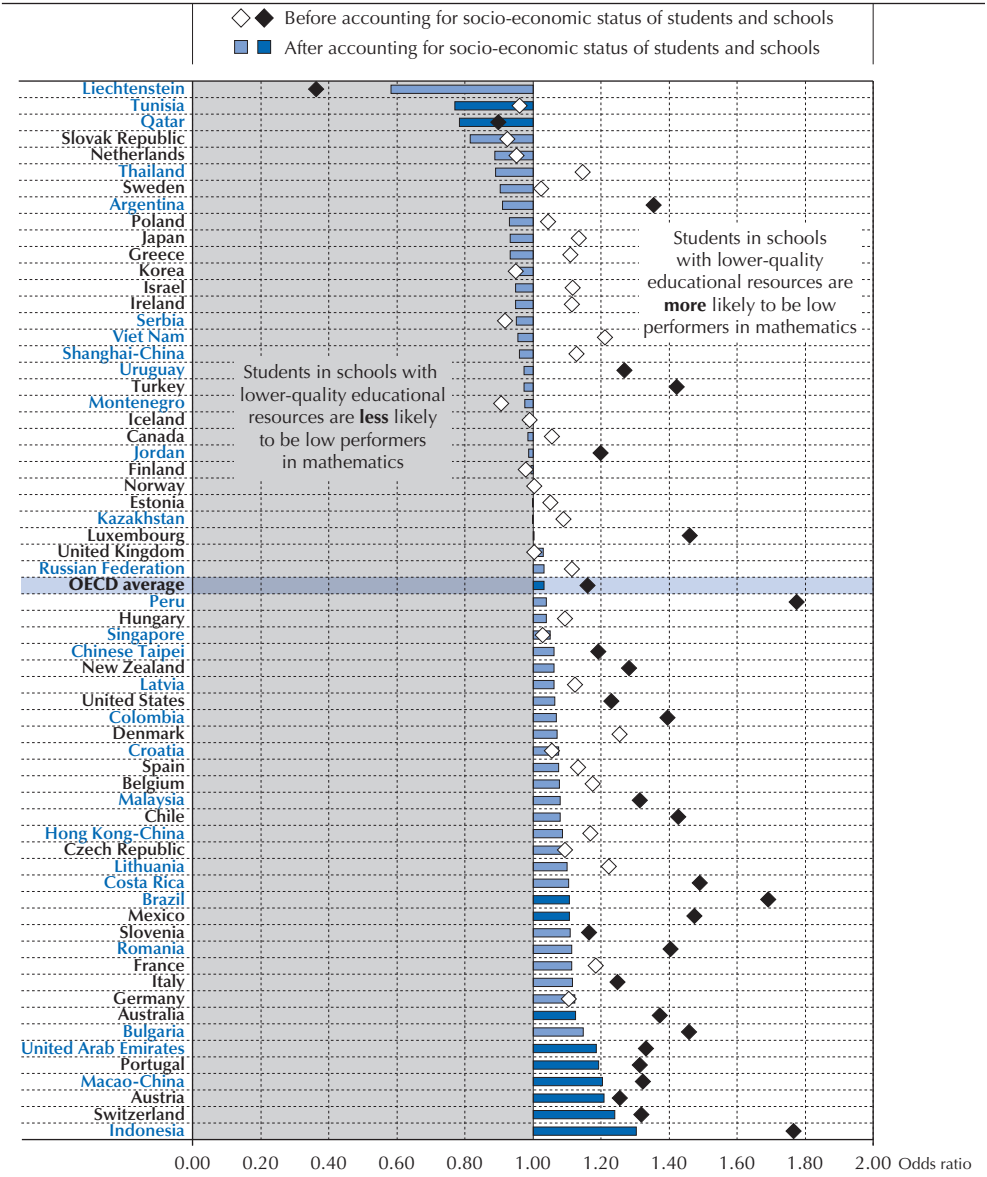
Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend schools where there is less parental pressure for high achievement, after accounting for students' and schools' socio-economic status.

Source: OECD, PISA 2012 Database, Table 4.21.

StatLink http://dx.doi.org/10.1787/888933315758

■ Figure 4.13 ■

Quality of educational resources and the likelihood of low performance in mathematics



Note: Statistically significant coefficients are marked in a darker tone.

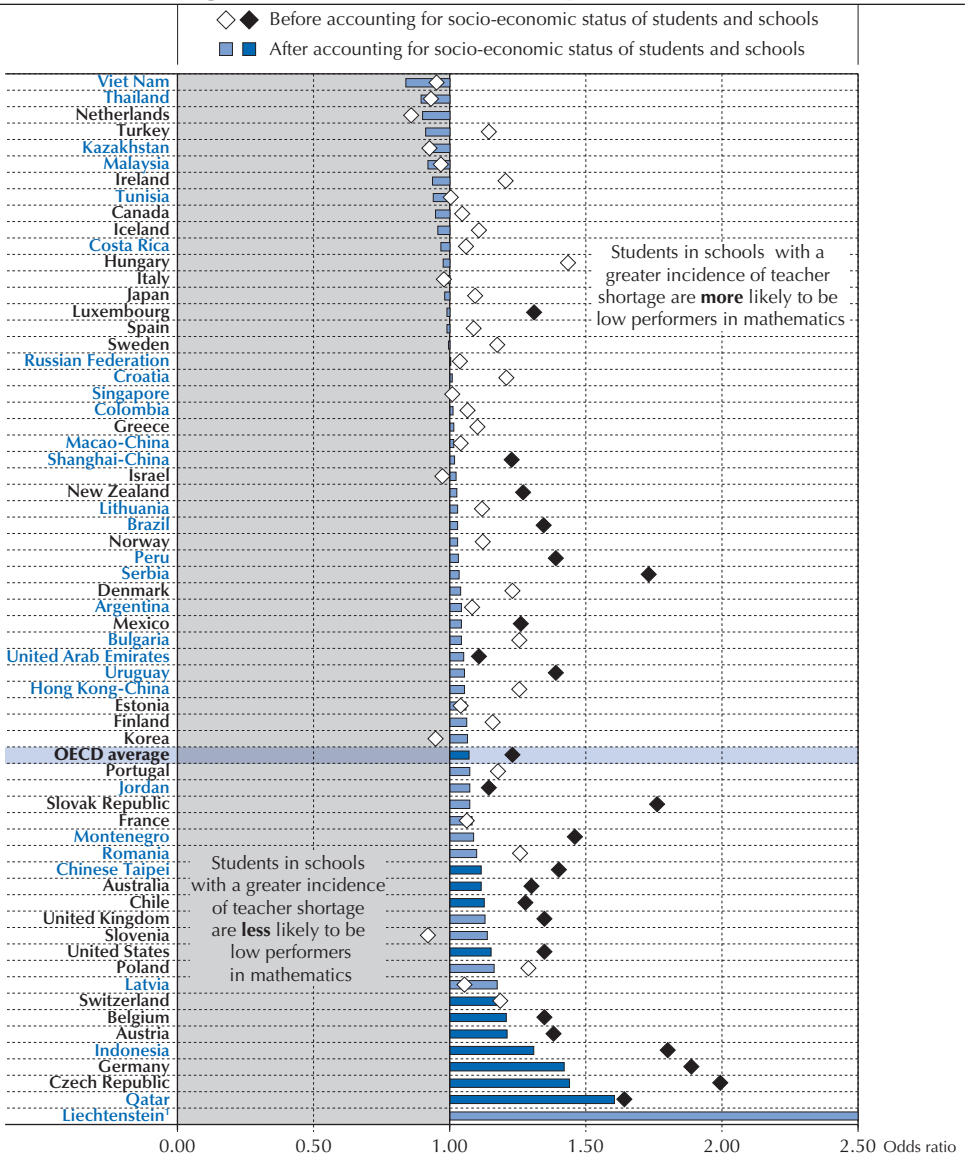
Countries and economies are ranked in ascending order of the odds ratio of low-performance in mathematics of students attending a school with higher values in the index of quality of schools' educational resources*, after accounting for students' and schools' socio-economic status.*

Source: OECD, PISA 2012 Database, Table 4.23.

StatLink http://dx.doi.org/10.1787/888933315761

■ Figure 4.14 ■

Teacher shortage and the likelihood of low performance in mathematics



1. Coefficients for Liechtenstein, corresponding to before and after accounting for socio-economic status of students and schools, are too high to be shown in the figure (12.99 and 8.97, respectively); only the first coefficient is statistically significant.

Note: Statistically significant coefficients are marked in a darker tone.

Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend schools with higher values on the index of teacher shortage, *after accounting for students' and schools' socio-economic status.*

Source: OECD, PISA 2012 Database, Table 4.25.

StatLink http://dx.doi.org/10.1787/888933315777

Private schools, as defined in PISA and in this report, refer to schools managed directly or indirectly by a non-government organisation (such as a church, trade union, business or other private institution). Depending on whether or not they receive funding from the government, private schools can be considered as private-independent schools (50% or more of their funding comes from private sources) or private-dependent schools (at least 50% of their funding comes from the government). Public schools are those managed by a public education authority.

Student enrolment in private schools (both dependent and independent of government funds) varies greatly across countries and economies. In 35 countries and economies that participated in PISA 2012, less than 10% of 15-year-old students were enrolled in private schools. In Hong Kong-China and Macao-China, on the contrary, more than 90% of students were enrolled in private schools; in Chile and the Netherlands, about two out of three students were enrolled in private schools; in Indonesia, Ireland, Korea, the United Arab Emirates and the United Kingdom, more than 40% of students were enrolled in private schools; and in Argentina, Australia, Japan, Qatar, Spain and Chinese Taipei, about one in three 15-year-olds students were enrolled in private schools (Table 4.26).

In general, there are more low performers in public schools than in private schools. This is to be expected, given the different socio-economic profiles of public and private schools. On average across OECD countries with sufficient data, 25% of students attending public schools were low performers in mathematics in PISA 2012, 20% of students attending private, government-dependent schools were low performers, and 13% of students attending independently funded private schools were low performers in mathematics (Table 4.26). In some countries, the difference in the percentage of low performers between public and private-independent schools is much larger: in Chile, it is 55 percentage points, and in Brazil, Costa Rica, Qatar and Uruguay, it is over 40 percentage points. By contrast, in Chinese Taipei and Thailand, there are more low performers in private-independent schools than in public schools.

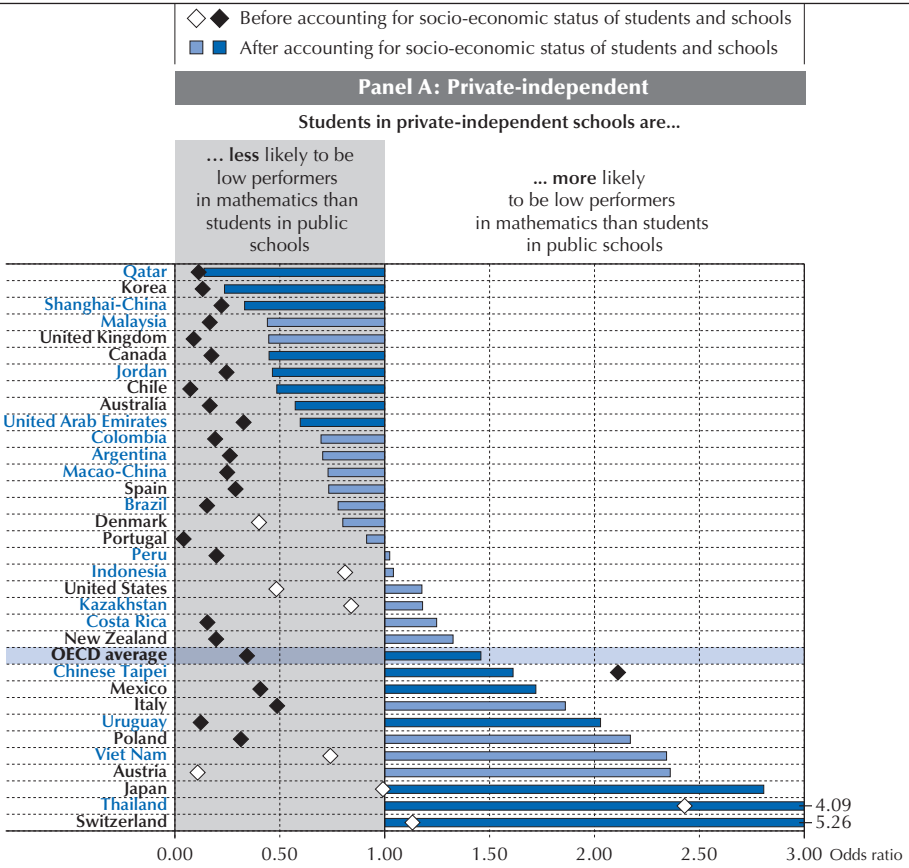
Once the socio-economic status of students and schools are taken into account, the association between school type and low performance changes dramatically, as shown in Figure 4.15. On average across OECD countries, before accounting for socio-economic factors, students enrolled in private-independent schools are significantly less likely to be low performers in mathematics than students in public schools (odds ratio of 0.3); but after accounting for those factors, they are 1.5 times more likely to be low performers. The greater likelihood of low performance among students in private-independent schools, compared with students in public schools, is notable in Switzerland and Thailand, and observable also in Japan, Mexico, Chinese Taipei and Uruguay. In eight countries and economies that participated in PISA 2012, public school students are more likely to be low performers than students enrolled in private-independent schools, even after accounting for socio-economic factors.

Differences in the likelihood of low performance related to whether a student attends a private-dependent or a public school change radically after accounting for socio-economic factors. On average across OECD countries, the odds of low performance are significantly lower among students in private-dependent schools (a statistically significant odds ratio of 0.8) compared with

students in public schools, before accounting for socio-economic factors; but those differences disappear after accounting for socio-economic factors (the odds ratio of 1.2 for low performance among students in private-dependent schools is not statistically significant). In five of the countries and economies that participated in PISA 2012 (Estonia, France, Indonesia, Luxembourg and Thailand), students in public schools are significantly less likely to be low performers, as are students enrolled in private-dependent schools in six other countries (Argentina, Brazil, Canada, Macao-China, Portugal, Spain).

■ Figure 4.15 [Part 1/2] ■

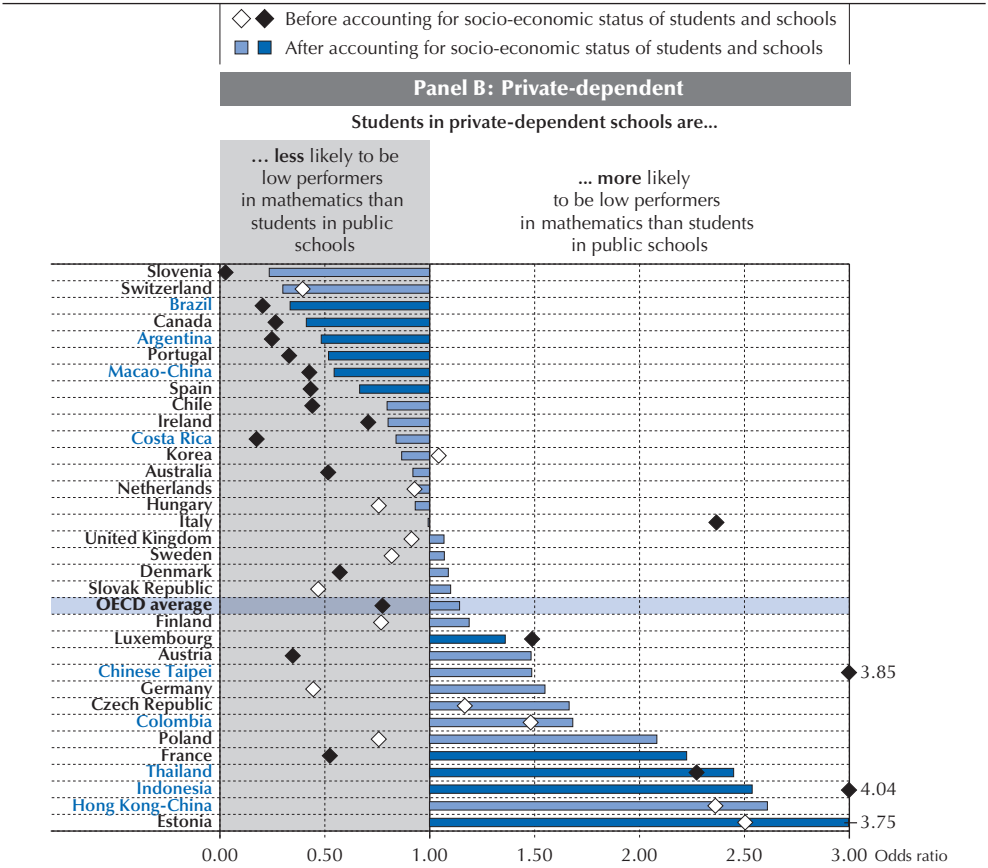
School type and the likelihood of low performance in mathematics



Notes: Statistically significant coefficients are marked in a darker tone.
The OECD average shown in this panel represents only the OECD countries with available data.
Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend private-independent schools (Panel A), compared with students who attend public schools, after accounting for students' and schools' socio-economic status.
Source: OECD, PISA 2012 Database, Table 4.27.
StatLink http://dx.doi.org/10.1787/888933315786

■ Figure 4.15 [Part 2/2] ■

School type and the likelihood of low performance in mathematics



Notes: Statistically significant coefficients are marked in a darker tone.
The OECD average shown in this panel represents only the OECD countries with available data.
Countries and economies are ranked in ascending order of the odds ratio of low performance in mathematics among students who attend private-dependent schools (Panel B), compared with students who attend public schools, after accounting for students' and schools' socio-economic status.
Source: OECD, PISA 2012 Database, Table 4.27.
StatLink http://dx.doi.org/10.1787/888933315786

These findings confirm that in most countries/economies, socio-economic differences between students and schools account for a considerable part of the differences in the proportions of low-performing students between public and private schools. The greater odds of low performance among students in private-independent schools, after accounting for socio-economic factors, suggest that private-independent schools may not provide the support low performers need. These schools tend to have larger concentrations of advantaged students who are at lower risk of low performance. However, the wide variation across countries makes it hard to draw general conclusions from these findings and further national-level analyses are required.

Note

1. School principals were asked to report the extent to which their mathematics instruction catered to students with different abilities (SC15). The first two items asked about the use of ability grouping into different classes either with similar content but different levels of difficulty or with different content. One item asked about ability grouping within classes and the second asked about the use of different pedagogies within a class rather than ability grouping. Response categories were "For all classes", "For some classes" and "Not for any class". An *index of ability grouping for mathematics classes* (*ABGMATH*) was derived from the first two items by assigning schools to three categories: schools with no ability grouping for any class; schools with one of these forms of ability grouping for some classes; and schools with one of these forms of ability grouping for all classes.

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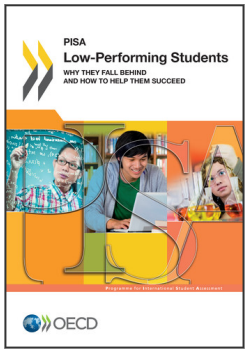

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