4 Equity in education in PISA 2022

This chapter reports on fairness in education by analysing performance differences by student socio-economic status, gender, and social and economic contexts across education systems. It also reports on educational inclusion by examining students' acquisition of basic proficiency skills in PISA core domains and the proportion of young people enrolled in school at age 15.

For Australia, Canada, Denmark, Hong Kong (China), Ireland, Jamaica, Latvia, the Netherlands, New Zealand, Panama*, the United Kingdom and the United States, caution is required when interpreting estimates because one or more PISA sampling standards were not met (see Reader's Guide, Annexes A2 and A4).

What the data tell us

- Education systems in Canada*, Denmark*, Finland, Hong Kong (China)*, Ireland*, Japan, Korea, Latvia*, Macao (China) and the United Kingdom* are highly equitable according to PISA's definition. They have achieved high levels of socio-economic fairness together with a large share of all 15-year-olds with basic proficiency in mathematics, reading and science (i.e. high level of inclusion).
- About 15% of the variation in mathematics performance on average across OECD countries can be attributed to students' economic, social and cultural background. In 8 of the 80 countries and economies with available data, students' socio-economic status accounts for 20% or more of the variation in performance. By contrast, students' socio-economic status accounts for less than 7% of the variation in performance in 14 countries.
- Boys outperformed girls in mathematics by nine score points and girls outperformed boys in reading by 24 score points on average across OECD countries. In science, the performance difference between boys and girls is not significant. In terms of low performers, the share of boys (31%) is larger than girls (22%) in reading but in mathematics the share is almost identical (32% for girls and 31% for boys). When it comes to top performers, the proportion of boys (11%) is larger than girls (7%) in mathematics whereas in reading it is slightly higher for girls (8%) than boys (6%) on average across OECD countries. In science, the share of low performers is larger for boys than girls by two percentage points; similarly, the share of top performers is larger for boys than girls by two percentage points.
- On average across OECD countries, 45% of all 15-year-olds have not acquired basic proficiency in at least one of the core subjects PISA assesses. In 38 countries and economies, more than 60% of all 15-year-olds scored below baseline proficiency Level 2 in at least one subject. By contrast, fewer than 25% of 15-year-olds were low performers in at least one subject in five countries/economies.

Equity is a fundamental value and goal of education policy. Equity in education is an ethical principle associated to the concept of justice and a normative term according to which all people, regardless of background, should have the opportunity to fulfil their potential.

As school enrolment expanded through the 20th century, this opened unprecedented educational opportunities to social groups previously excluded from formal education. Nonetheless, socio-economic inequalities in educational attainment and learning outcomes remain stubbornly persistent up to this day (Pfeffer, 2008[1]; Breen, 2010[2]; Torche, 2018[3]; OECD, 2018[4]; Chmielewski, 2019[5]). In the 21st century, enrolment in higher education and pre-primary education has increased greatly. At the same time, educational disparities linked to gender, immigration status, geographical location (e.g. urban vs. rural areas), disabilities, and other student background characteristics have gained visibility as sources of inequity in educational enrolment and learning (Buchmann, DiPrete and McDaniel, 2008[6]; Hillmert, 2013[7]; OECD, 2023[8]).

Importantly, international differences in the extent and types of educational inequity observed by PISA today can be traced back to the historical legacies of different nations. For example, in Central and South America, most countries passed compulsory school laws in the 19th century that were rarely enforced, and primary school enrolments did not substantially increase until the second half of the 20th century; this has made the universalisation of secondary schooling a contemporary challenge (Benavot, Resnik and Corrales, 2006[9]).

Equity in education does not mean that all students should achieve the same results; indeed, some degree of variation in student results is to be expected in any education system, even those with high levels of equity. The goal of equity-oriented policies is not to curtail the academic achievement of top-performing students nor "dumb down" education systems so that they produce homogeneous outcomes. Instead, equity-oriented policies should help all students become the best version of themselves.

This chapter analyses two dimensions of equity in education: fairness and inclusion. Only education systems that combine high levels of fairness and inclusion are considered highly equitable.

Fairness is the goal of all students being given the opportunity to realise their full learning potential, irrespective of their background: this is examined in the first three sections. The first of these sections looks at socio-economic disparities in student performance within countries; the second section looks at gender disparities in student performance; and the third section examines equality of opportunity by education system.

Inclusive education is examined in the fourth section of this chapter. In PISA, inclusion is the goal of all students having access to quality education and achieving at least the baseline level of skills in mathematics, reading and science.

Equal opportunity by student socio-economic status

Fairness in education means that all students, irrespective of their background, are given the opportunity to realise their full learning potential[1]. In a fair educational system, students' learning outcomes would be independent of background circumstances such as their family socio-economic status, immigration background or gender because these are circumstances over which students have no control. In PISA, education systems that better disassociate students' performance from background circumstances have a higher level of fairness. PISA data show, however, that personal circumstances such as socio-economic status; gender and the stereotypes that ensue; immigration status; and which education system students are in do, in practice, create privileges or barriers that make it easier for some students to perform better than others. Furthermore, these individual circumstances may contribute to shaping students' aspirations, motivation and effort, with consequences for their cognitive outcomes.

The effects of socio-economic status on student achievement are well-known, and specific economic and cultural mechanisms linking students' socio-economic status and achievement have been studied extensively (Bourdieu, 1986[10]; Coleman, 1988[11]; Paino and Renzulli, 2012[12]; Kao and Thompson, 2003[13]; Eriksson et al., 2021[14]). Students whose parents have higher levels of education, and more prestigious and better-paid jobs benefit from a wider range of financial (e.g. private tutoring, computers, books), cultural (e.g. extended vocabulary, time management skills) and social (e.g. role models and networks) resources. This makes it easier for them to succeed in school compared with students from families with lower levels of education or that are affected by chronic unemployment, low-paid jobs or poverty. Economic deprivation and adversity during early childhood undermine cognitive development (Richards and Wadsworth, 2004[15]; Duncan, Brooks-Gunn and Klebanov, 1994[16]).

In addition, several factors and experiences throughout students' lives mediate the relationship between socio-economic background and student performance, as measured by PISA at age 15. There is a socio-economic gap, for instance, in terms of whether children have taken part or not in early childhood education and care. This manifests as a demonstrable socio-economic gap in performance in students as young as 10 years old in primary school (OECD, 2018[4]). Recent international evidence also points to gaps in skills linked to socio-economic background among children of age 5 (OECD, 2020[17]). And, these gaps in performance can widen in later years. By age 15, socio-economic status has a large influence on students' performance in mathematics, reading and science. Disadvantaged students are more likely to repeat grades and enrol in upper secondary vocational rather than general programmes. They are also less likely to expect to complete a post-secondary degree. As students complete their compulsory education, disadvantaged students show lower rates of entry to higher education; reduced rates of study completion; and poorer labour market outcomes.

Student performance is related to socio-economic status but this relationship is far from deterministic. Previous evidence has shown that some students can break the cycle of disadvantage, beat the odds against them and achieve better performance in PISA than would have been expected given their socio-economic status (OECD, 2011[18]). In this volume, these students with academic resilience ("resilience students") are defined as those who are socio-economically disadvantaged yet score among the highest in PISA in their own country or economy.

Students' socio-economic status

PISA-participating countries and economies vary markedly in their levels of wealth and per-capita income (see Figure I.4.14 below). This translates into differences in the socio-economic status of the students who take the PISA test in various countries and economies.[2]

Figure I.4.1 shows the average socio-economic status of students in each country and economy that participated in PISA 2022, as measured by the PISA index of economic, social and cultural status (ESCS) (see Box I.4.1 and Annex A3 for a detailed definition of this index). By design, the average student socio-economic status across OECD countries approximates zero. Across all countries and economies, the average student socio-economic status is the highest in Norway, Denmark*, Canada*, Australia*, and Iceland (in descending order of their mean ESCS index). It is the lowest in Guatemala, Indonesia, Morocco and Cambodia (in descending order).

Figure I.4.1. Student socio-economic status

PISA index of economic, social and cultural status (ESCS)

Notes: Only countries and economies with available data are shown.

All differences between the 90th and the 10th percentiles are statistically significant (see Annex A3).

Countries and economies are ranked in descending order of the mean PISA index of economic, social and cultural status of students for all students.

Source: OECD, PISA 2022 Database, Table I.B1.4.2.

Figure I.4.1 also shows how students' socio-economic status varies within countries/economies. On average across OECD countries, the difference between the socio-economically most advantaged students (i.e. 90th percentile of ESCS) and the most disadvantaged students (i.e. 10th percentile of ESCS) within countries is 2.34 points in the PISA index of economic, social and cultural status (hereafter, this difference will be referred to as the inter-decile range of student socio-economic status). By this measure, the range of socio-economic inequality within countries/economies is the widest in Morocco, Guatemala, Paraguay, Panama* and Peru (in descending order). It is the narrowest in the United Arab Emirates, Denmark*, Japan, Canada*, Iceland and Norway (in ascending order).

Socio-economic disparities within countries/economies tend to be smaller in countries/economies where the average socio-economic status of the student population is higher (Figure I.4.1). Across all countries and economies in PISA 2022 with data available[3], the correlation between the mean and the inter-decile range of student socio-economic status is very strong (correlation coefficient = -0.89). Examples of this pattern in PISA 2022 are Canada*, Denmark*, Iceland and Norway, which stand out as countries with the highest average socio-economic status and some of the narrowest socio-economic differences between the most and least advantaged students. Inversely, Guatemala and Morocco stand out as countries with the lowest average student socio-economic status and the widest socio-economic differences between the most and least advantaged students.

In about one-third of countries and economies, differences in socio-economic status are larger *within* countries/economies than *between* countries/economies participating in PISA 2022, as measured by the inter-decile range of student socio-economic status. While the gap between the country/economy with the highest (i.e. Norway) and lowest (i.e. Cambodia) mean socio-economic status is equal to 2.5 points in the PISA index of economic, social and cultural status, the difference between the top and the bottom decile of student socio-economic status within a country/economy (i.e. the inter decile range) is more than 2.6 points in 28 countries/economies.

Box I.4.1. Definition of socio-economic status in PISA

Socio-economic status is a broad concept that aims to capture students' access to family resources (i.e. economic capital, social capital, and cultural capital) and the social position of the student's family/household (Cowan et al., 2012[19]; Willms and Tramonte, 2015[20]; Avvisati, 2020[21]).

In PISA, a student's socio-economic status is measured by the PISA index of economic, social and cultural status (ESCS). The higher the value of ESCS, the higher the socio-economic status. The ESCS scale has a mean of 0 and a standard deviation of 1 across OECD countries.

ESCS is a composite score that combines into a single score information from three components: parents' highest level of education (PARED index[1]); parents' highest occupational status (HISEI index[1]); and home possessions (HOMEPOS index[1], which is a proxy for family wealth). Information about these three components for each student was collected through the student questionnaire, a survey that students answered after completing the PISA cognitive assessment.

For a more technical description of how the index is computed, please see *PISA 2022 Technical Report* (OECD, Forthcoming[22])

Socio-economically advantaged and disadvantaged students

In this report, the PISA index of economic, social and cultural status (ESCS) is used to distinguish between socio-economically disadvantaged students (i.e. those among the 25% of students with the lowest values on the ESCS index in their country or economy) and socio-economically advantaged students (i.e. those among the 25% of students with the highest values on the ESCS in their own country or economy).

Notes: 1. See Annex A1 for detailed information on this index.
Source: PISA 2022 Technical Report (OECD, Forthcoming[22])

Students' socio-economic status and mean performance[4]

In PISA, the socio-economic gradient is used to examine the relationship between students' socio-economic status and student performance in each country and economy. This is a measure of the relationship between student socio-economic status and student performance whereby a stronger association means less fairness (thus, less equity) (Willms, 2006[23]). The socio-economic gradient offers two key pieces of information: the *strength* of the gradient and the *slope* of the gradient.

The *strength* of the gradient is measured by the proportion of the variation in student performance that is accounted for by differences in student socio-economic status. When the relationship between socio-economic status and performance is strong, socio-economic status predicts performance well. In other words, a system is fairer when the relationship between socio-economic status and performance is weaker.

On average across OECD countries in 2022, students' socio-economic status accounts for a significant share of the variation in their performance in PISA; as shown in Figure I.4.2, 15% of the variation in mathematics performance within each country is associated with socio-economic status. In 8 of the 80 countries and economies with available data, students' socio-economic status accounts for 20% or more of the variation in performance. By contrast, students' socio-economic status accounts for less than 7% of the variation in performance in 14 countries.

While a weak association between student socio-economic status and performance within countries/economies is necessary for achieving fairness in education, it is not, of itself, a sufficient condition. It is also important to consider fairness in terms of education systems' overall levels of performance (performance disparities across education systems are discussed later in this chapter). A country/economy that combines high levels of fairness in terms of student socio-economic status with low mean performance – indicating poor achievement across the board regardless of students' socio-economic status – should not be taken as a desirable outcome.

As shown in Figure I.4.2, countries and economies with higher levels of fairness by socio-economic status are not often those with strong student performance[5].

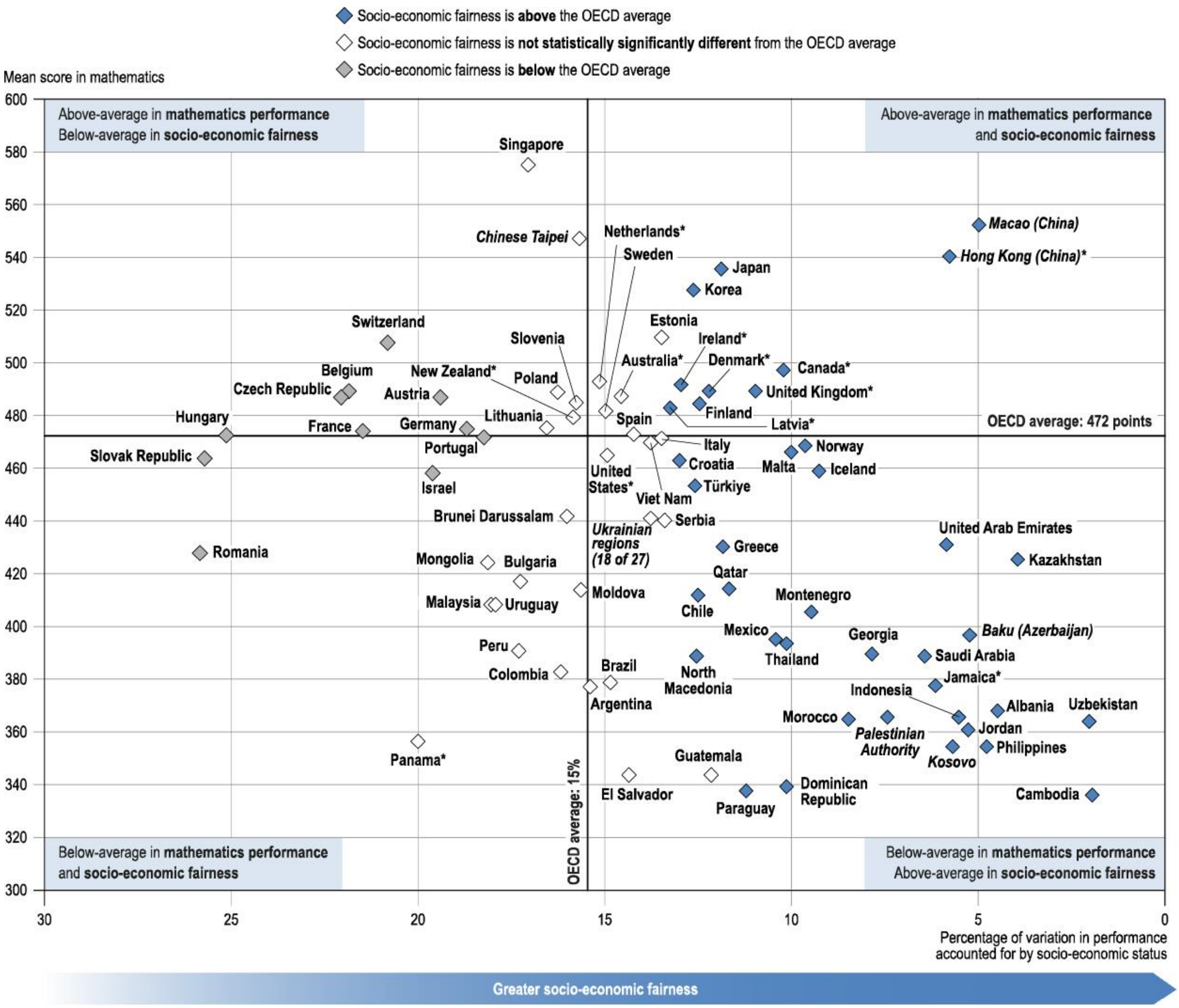
Mean performance in mathematics varies greatly among education systems with a high level of socio-economic fairness in student performance. Out of the 40 countries and economies where the strength of the relationship between performance and socio-economic status is weaker than the OECD average, 10 show a mean performance in mathematics that is higher than the OECD average of 472 points (Macao [China], Hong Kong [China]*, Japan, Korea, Canada*, Ireland*, Denmark*, the United Kingdom*, Finland, and Latvia*, in descending order of their mean score in mathematics) (Figure I.4.2). One education system with a high level of fairness in terms of socio-economic status has a mean performance in mathematics that is not statistically significantly different from the OECD average (Norway). The remaining 29 countries and economies show a mean performance in mathematics that is statistically significantly lower than the OECD average.

Hong Kong (China)* and Macao (China) are particularly remarkable because they combine very high levels of student performance (mean score in mathematics equal to 540 points or higher) and very high levels of fairness in mathematics performance by socio-economic status (less than 6% of variation in mathematics performance accounted for by student socio-economic status). As shown in Figure I.4.2, all other 11 countries/economies that have such a weak relationship between student socio-economic status and mathematic performance (i.e. less than 6% of variation in mathematics performance accounted for by student socio-economic status) show a mean performance in mathematics that is statistically significantly lower than the OECD average.

Out of the 29 countries and economies that show a level of fairness in terms of socio-economic status that is not statistically significantly different from the OECD average, nine have a mean performance in mathematics that is higher than the OECD average; five a mean performance in mathematics that is not different from the OECD average, and 15 a mean performance in mathematics that is lower than the OECD average.

Similar to what is observed in mathematics, differences in students' socio-economic status account for 13% of the variation in reading and 14% of the variation in science performance on average across OECD countries (Table I.B1.4.4 and Table I.B1.4.5).

Figure I.4.2. Strength of socio-economic gradient and mathematics performance



Notes: Only countries and economies with available data are shown.

Socio-economic status is measured by the PISA index of economic, social and cultural status.

Source: OECD, PISA 2022 Database, Tables I.B1.2.1 and I.B1.4.3.

The *slope* of the socio-economic gradient indicates the degree of the disparity in average performance between two students whose socio-economic status differs by one unit in the PISA index of economic, social and cultural status. A positive value for the slope of the socio-economic gradient signals that advantaged students generally performed better than disadvantaged students in PISA 2022.

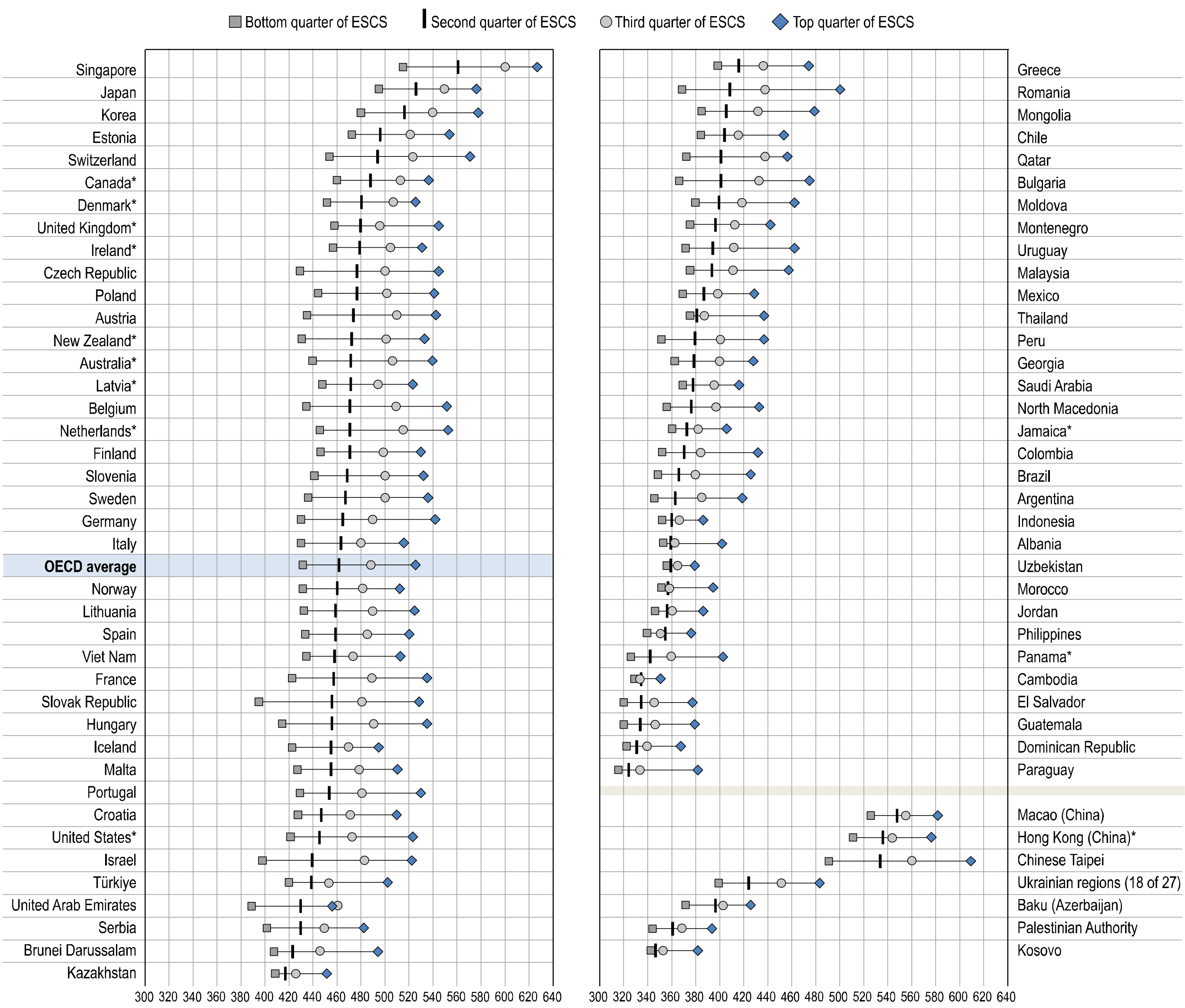
On average across OECD countries in 2022, a one-unit increase in the PISA index of economic, social and cultural status is associated with an increase of 39 score points in the mathematics assessment (Table I.B1.4.3). This is almost twice what 15-year-old students typically learn in a year (see Box I.5.1).

The performance gap related to students' socio-economic status is widest in the Slovak Republic where a one-unit increase in the index is associated with a difference of 53 score points in mathematics. In the Czech Republic, Israel and Singapore, the increase in the index is associated with a difference of 51 score points. By contrast, the associated change in performance amounts to less than 20 score points in 17 countries and economies. While the slope varied between countries/economies, in all countries/economies participating in PISA 2022 more advantaged students performed better than more disadvantaged ones.

However, socio-economic gradients do not give information about the *size* of performance gaps related to differences in socio-economic status between the most and least advantaged students within a country/economy. This metric is shown, instead, by the mean performance of students belonging to the top and bottom quarters of socio-economic status in a country/economy, as shown in Figure I.4.3.

Figure I.4.3. Mean performance in mathematics, by national quarter of socio-economic status

PISA index of economic, social and cultural status (ESCS)



Note: Only countries and economies with available data are shown.

Countries and economies are ranked in descending order of mathematics performance for students in the second quarter of national socio-economic status.

Source: OECD, PISA 2022 Database, Table I.B1.4.3.

On average across OECD countries, socio-economically advantaged students (those in the top quarter of the distribution in the ESCS index) scored 93 points more in mathematics than disadvantaged students (those in the bottom quarter of the distribution). The gap between these two groups of students is higher than 93 score points in 22 countries or economies while the gap is 50 points or less in 13 countries or economies (Figure I.4.3).

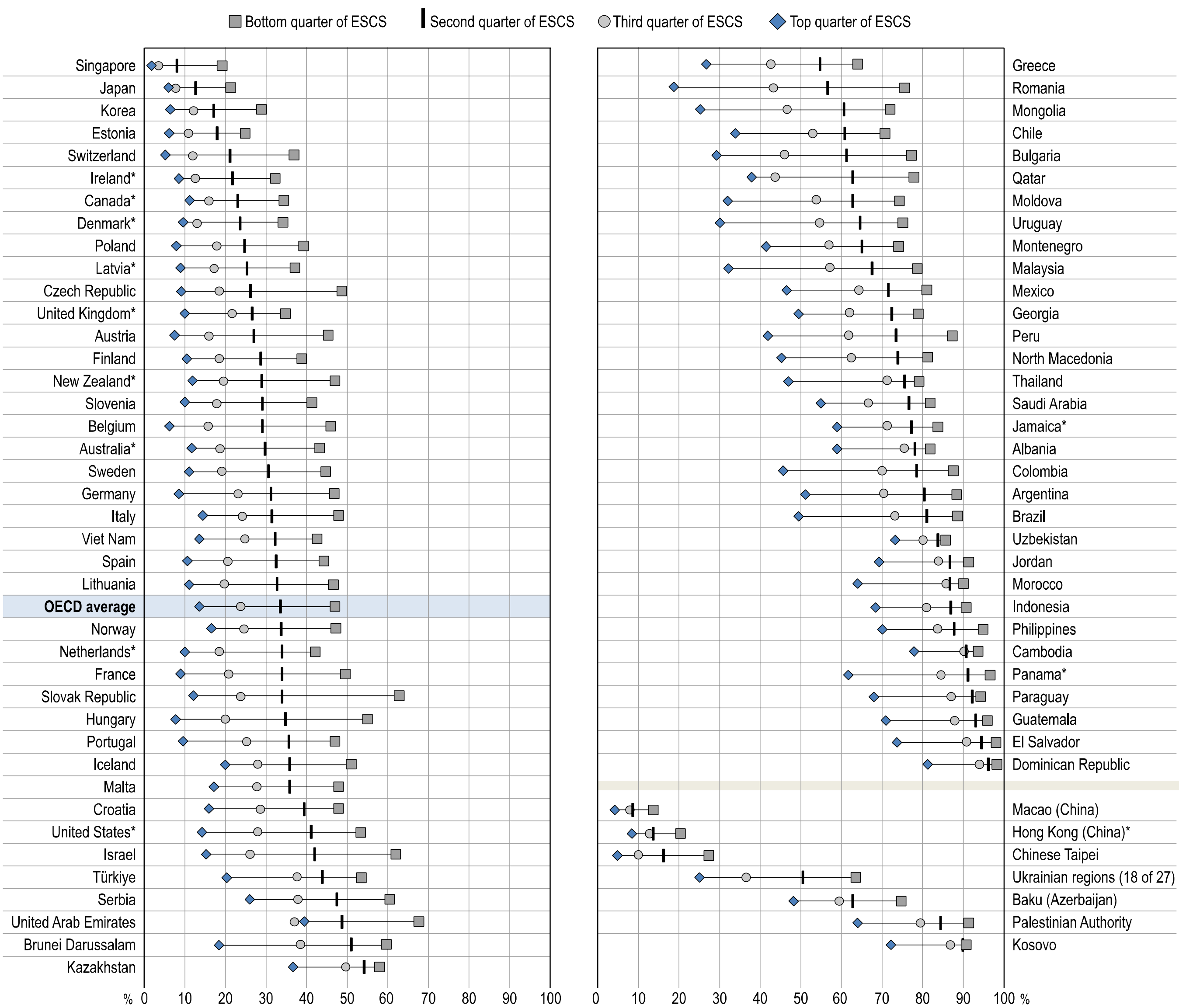
Low performance and socio-economic status

As shown in Figure I.4.4, 47% of socio-economically disadvantaged students but only 14% of advantaged students scored below proficiency Level 2 in mathematics (33 percentage-point difference) on average across OECD countries. The gap in the percentage of low performers in mathematics between advantaged and disadvantaged students is 30 percentage points or more in most countries and economies; in Romania and the Slovak Republic it is more than 50 percentage points.

Socio-economically disadvantaged students are seven times more likely than advantaged students to score below Level 2 in mathematics on average across OECD countries (Table I.B1.4.10). When it comes to reading and science, the odds of low performance are also more than five times higher for disadvantaged students compared to their advantaged peers on average across OECD countries (Table I.B1.4.11 and Table I.B1.4.12).

Figure I.4.4. Low performers in mathematics, by socio-economic status

Percentage of students who scored below proficiency Level 2, by national quarters of the PISA index of economic, social and cultural status (ESCS)



Note: Only countries and economies with available data are shown.
Countries and economies are ranked in ascending order of the share of low performers in mathematics for students in the second quarter of national socio-economic status.
Source: OECD, PISA 2022 Database, Table I.B1.4.14.

Disadvantaged students who are academically resilient

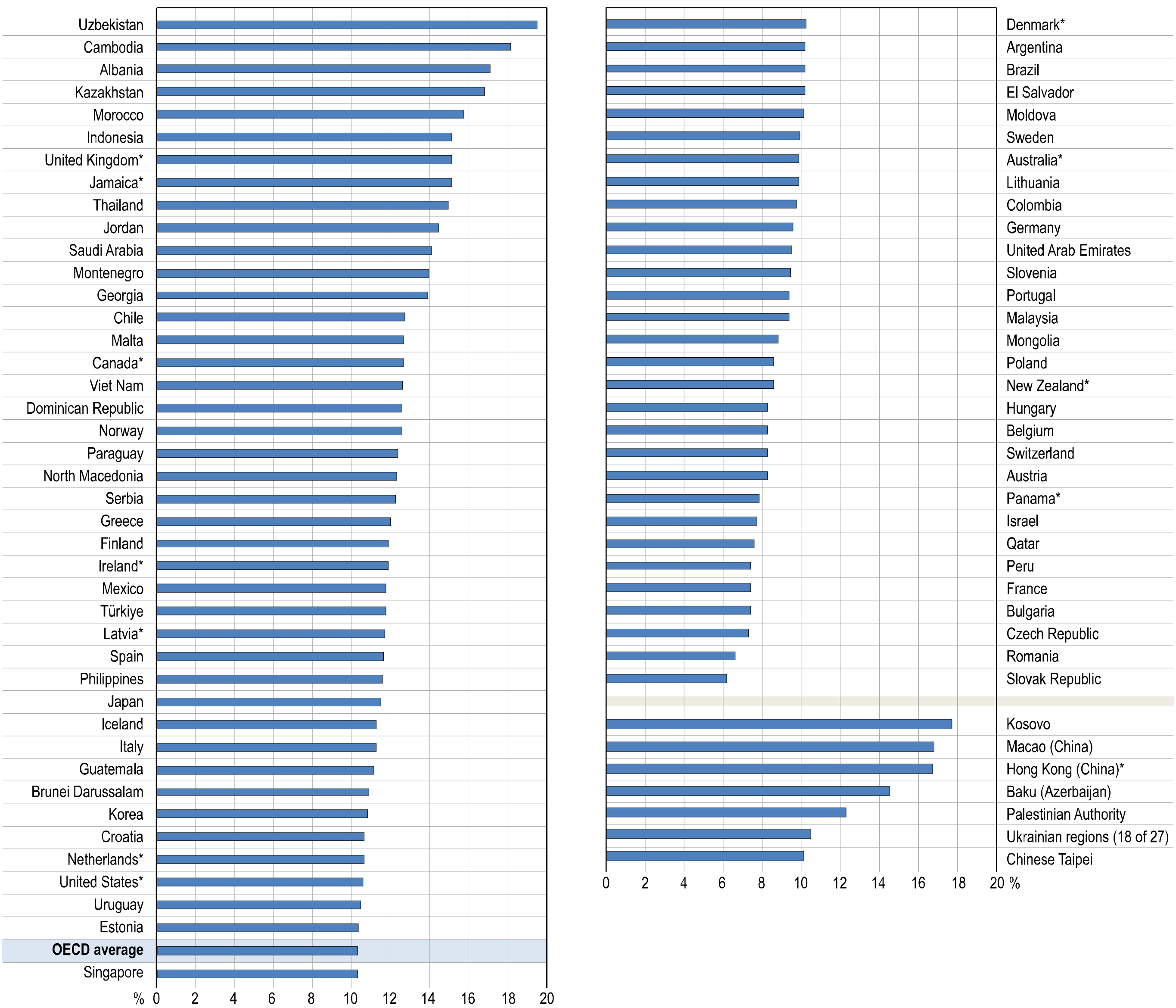
Academically resilient students are defined in PISA as students who are in the bottom quarter of the PISA index of economic, social and cultural status (ESCS) in their own country/economy but scored in the top quarter in that country/economy. These students are academically resilient because, despite their socio-economic disadvantage, they have attained educational excellence by comparison with students in their own country.

As shown in Figure I.4.5, the percentage of academically resilient students in mathematics varies from less than 8% in some countries (Bulgaria, the Czech Republic, France, Israel, Panama*, Peru, Qatar, Romania and the Slovak

Republic) and) to more than 15% in others (Albania, Cambodia, Hong Kong [China]*, Indonesia, Jamaica*, Kazakhstan, Kosovo, Macao [China], Morocco, the United Kingdom* and Uzbekistan). On average across OECD countries, 10% of disadvantaged students scored in the top quarter of mathematics performance in their own countries and thus can be considered academically resilient. In reading and science, the percentage of academically resilient students is 11% on average across OECD countries (Table I.B1.4.4 and Table I.B1.4.5).

Figure I.4.5. Resilient students in mathematics

Percentage of socio-economically disadvantaged students who scored in the top quarter of mathematics performance in their own country/economy



Notes: Only countries and economies with available data are shown.
Socio-economic status is measured by the PISA index of economic, social and cultural status.
Countries and economies are ranked in descending order of the percentage of resilient students.
Source: OECD, PISA 2022 Database, Table I.B1.4.3.

Box I.4.2. Food insecurity: how often do students not eat because they do not have money?

A new question about food insecurity was included in the student questionnaire in PISA 2022. Shockingly, results show that in all PISA-participating countries there are 15-year-old students who suffer from food insecurity, i.e. who had to skip one or more meals a week in the month prior to PISA because they did not have enough money to buy food.

Food insecurity among PISA-participating countries in 2022

According to a recent international study in 83 low- and middle-income countries, the number of food insecure people in 2023 is about 1.14 billion (Zereyesus et al., 2023[24]). Personal income, food prices, and economic inequality are among the major factors affecting people’s ability to access food, according to this study. Furthermore, research shows that food insecurity impairs children's learning and educational progress (Argaw et al., 2023[25]).

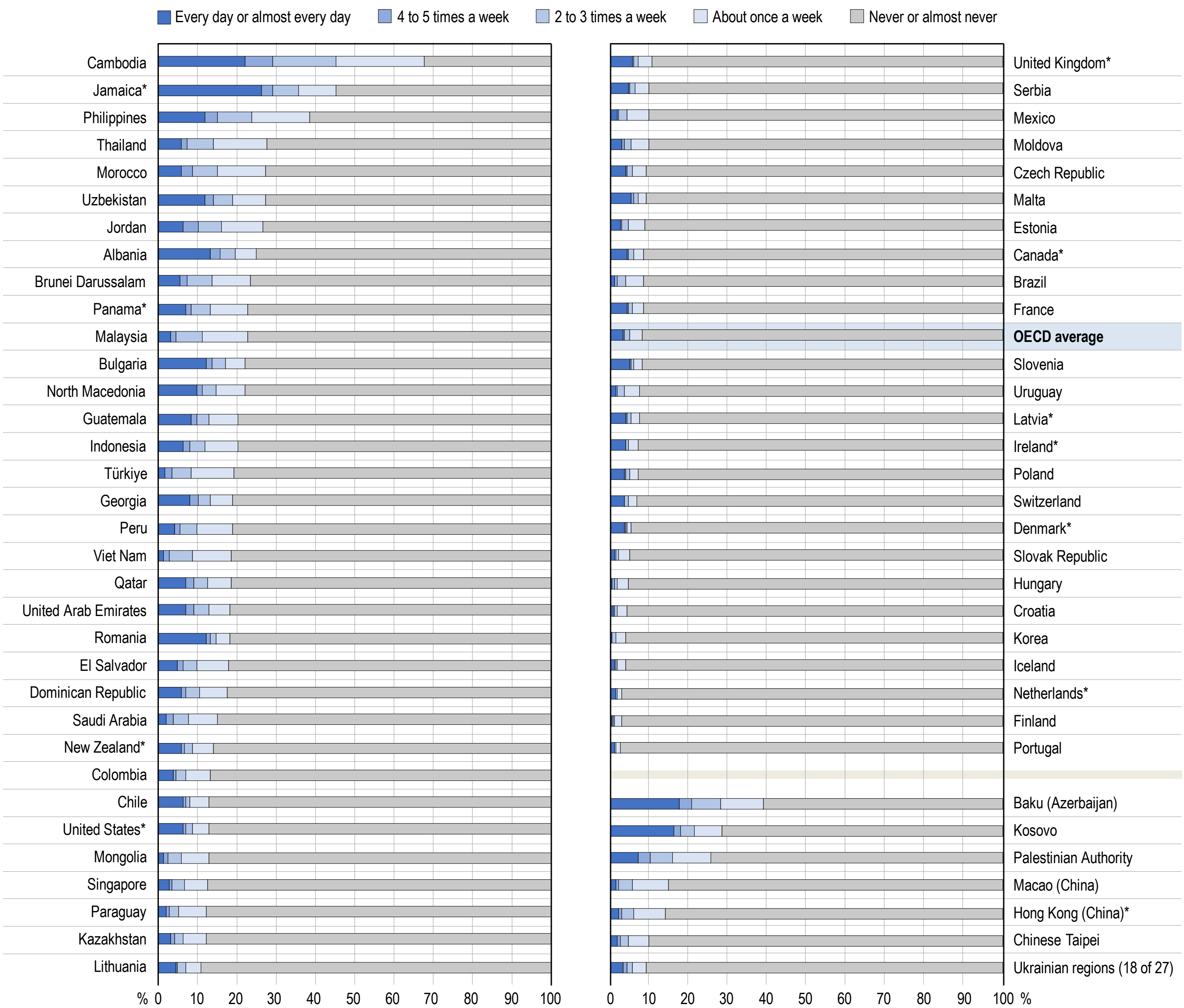
In PISA 2022, the following question was included in the student questionnaire: “In the past 30 days, how often did you not eat because there was not enough money to buy food?” Response categories were: “Never or almost never”, “About once a week”, “2 to 3 times a week”, “4 to 5 times a week”, and “Every day or almost every day”.

On average across OECD countries, 8.2% of students reported not eating at least once a week in the past 30 days because there was not enough money to buy food. Some OECD countries have some of the lowest proportions (below 3%), notably Portugal (2.6%), Finland (2.7%) and the Netherlands* (2.8%). However, there are OECD countries where the proportion of students suffering from food insecurity exceed 10%, including the United Kingdom* (10.5%), Lithuania (11%), the United States* (13%), Chile (13.1%), Colombia (13.3%), New Zealand* (14.1%) and Türkiye (19.3%).

In 18 countries/economies, more than 20% of students reported not eating at least once a week due to lack of money. In Baku (Azerbaijan), Jamaica* and the Philippines, more than a third of students reported this but only in Cambodia is this the case for more than half of students (67.8%). All countries where at least a quarter of students reported not eating at least once a week due to lack of money are among the lowest-performing countries/economies in mathematics in PISA 2022 (i.e. average performance below 400 score points).

Given the known relationship between performance and students’ socio-economic status, it is not surprising that there is a negative correlation between food insecurity and mathematics performance in PISA 2022 (Pearson’s r = -0.61)[6]. Food insecurity can affect not only students’ physical well-being but their educational opportunities and overall quality of life as well.

Figure I.4.6. Percentage of students that did not eat at least once a week in the past 30 days, because there was not enough money to buy food



Note: Only countries and economies with available data are shown.

Countries and economies are ranked in descending order of the percentage of students who did not eat at least once a week in the past 30 days, because there was not enough money to buy food.

Source: OECD, PISA 2022 Database, Tables I.B1.4.46

Equal opportunity in terms of student gender[7]

Another indicator of fairness considered in this volume are disparities in student performance between boys and girls.

Gender disparities in performance at age 15 may have long-term consequences for girls' and boys' personal and professional future (OECD, 2015[26]). Boys who lag behind and lack basic proficiency in reading may face difficulties in gaining access to further education, desirable positions in the labour market and full personal development.

Equally, the under-representation of girls among top performers in science and mathematics can partly explain the persistent gender gap in careers in science, technology, engineering, and mathematics (STEM) fields – which are often among the highest-paying occupations.

Gender differences in achievement are not explained by innate ability; instead, social and cultural contexts reinforce stereotypical attitudes and behaviours that, in turn, are associated with gender differences in student performance (OECD, 2015[27]). For example, boys are significantly more likely than girls to be disengaged from school, get lower marks, repeat grades, and play video games in their free time. Girls tend to behave better in class, get higher marks, spend more time doing homework, and read for enjoyment, particularly complex texts such as fiction, in their free time (OECD, 2019[28]). Girls are also less likely to repeat grades. But girls are more likely than boys to feel anxious about mathematics. And they are less likely than boys to believe they can successfully perform mathematics and science tasks at designated levels; to enrol in technical and vocational programmes or gain “hands-on” experience in potential careers through internships or job shadowing (OECD, 2015[26]).

Gender-related disparities in achievement thus appear to be neither innate nor inevitable. The magnitude of the gender gap in student performance varies across countries. Over the past few decades many countries have made significant progress in narrowing, and even closing, the gender gap in educational attainment (Van Bavel, Schwartz and Esteve, 2018[29]).

Gender and mean performance

In PISA 2022, boys outperformed girls in mathematics by nine score points on average across OECD countries (mean score difference in Figure I.4.7). While boys outperformed girls in mathematics in 40 countries and economies, girls outperformed boys in another 17 countries or economies. The widest gaps in mathematics performance in favour of boys (15 score points or more) were observed in Costa Rica, Peru, Macao (China), Chile, Austria and Italy (in ascending order); the widest gaps in favour of girls (15 score points or more) were observed in Palestinian Authority and Albania. In 24 countries and economies, the difference in mathematics performance between boys and girls is not statistically significant.

Figure I.4.7 shows not only differences in the average performance of boys and girls, but also differences at the extreme ends of the performance distribution. The 10th percentile is the point in the performance scale below which 10% of students score; these are the weakest-performing students in each country/economy. The 90th percentile is the point in the scale above which only 10% of students score; these are the highest-performing students.

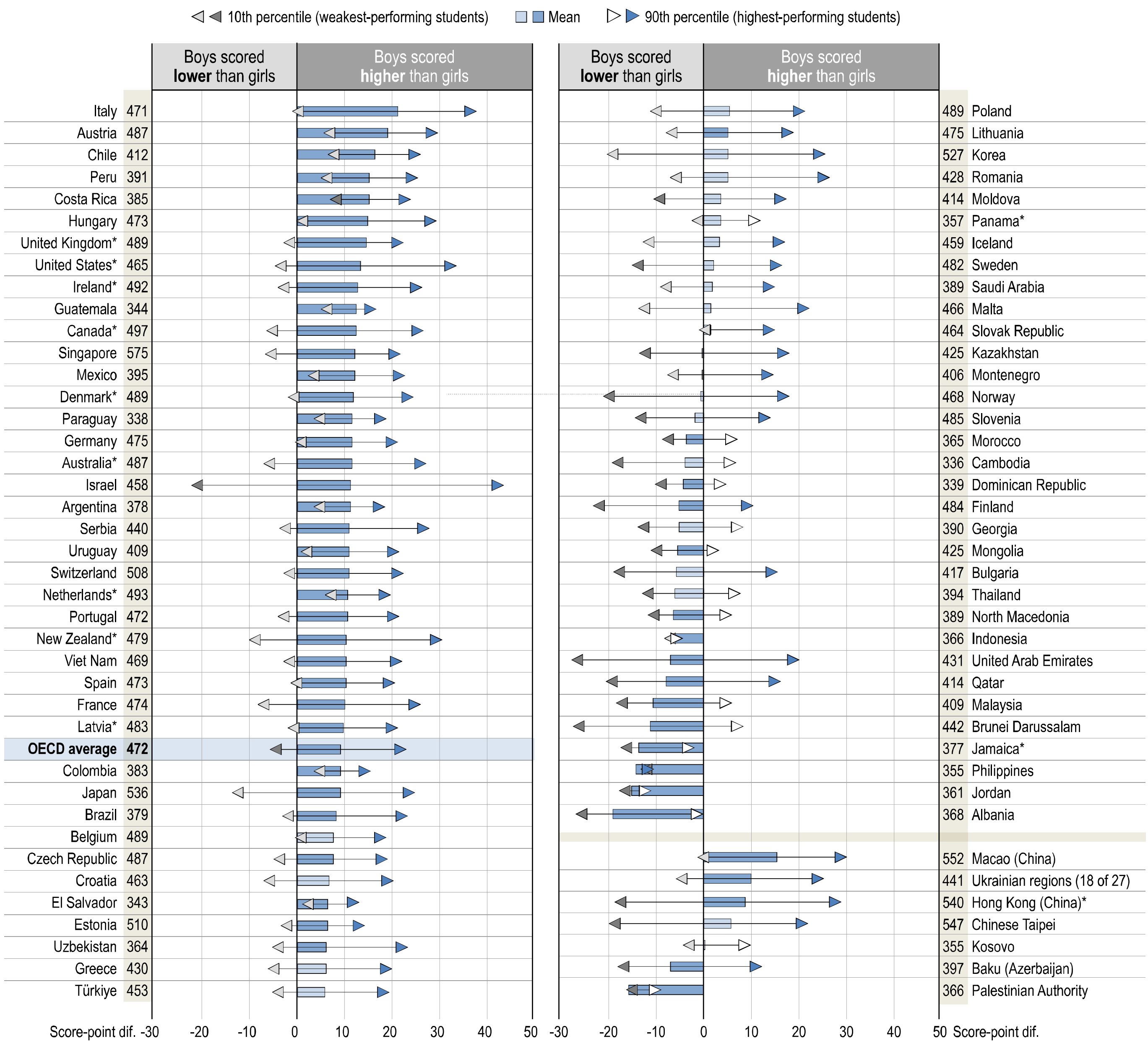
It is important to consider performance differences at these extremes because variability in student performance (as measured by the standard deviation) is greater among boys than girls in all subjects measured by PISA on average across OECD countries and in most countries/economies (Tables I.B1.4.17. I.B1.4.18 and I.B1.4.19).

In mathematics, the highest-performing boys outperformed the highest-performing girls on average across OECD countries (22 score points difference) and in most countries/economies (Figure I.4.7). In Israel, Italy and the United States*, the highest-performing boys outperformed the highest-performing girls by more than 30 score points.

Among the 10% weakest-performing students, girls outperformed boys on average across OECD countries (4 score points difference) and in 30 out of the 81 countries/economies (Figure I.4.7). In Brunei Darussalam, Cyprus and the United Arab Emirates, the weakest-performing girls outperformed the weakest-performing boys by more than 25 but less than 30 score points.

Figure I.4.7. Gender gap in mathematics performance

Score-point difference in mathematics between boys and girls



Notes: The mean score in mathematics is shown next to the country/economy name.

Statistically significant differences are shown in a darker tone (see Annex A3).

Countries and economies are ranked in descending order of the score-point difference in mathematics related to gender (boys minus girls).

Source: OECD, PISA 2022 Database, Tables I.B1.2.1 and I.B1.4.17.

In contrast to mathematics, girls performed better than boys in reading. On average across OECD countries, girls outperformed boys in reading by 24 score points (mean score difference in Figure I.4.8). Girls outperformed boys in reading in all countries and economies, with two exceptions (in Chile and Costa Rica the difference in reading performance between boys and girls is not statistically significant). The widest gaps in reading performance in favour of girls (40 score points or more) were observed in Albania, Qatar, Norway, Slovenia, United Arab Emirates, Finland, Jordan and Palestinian Authority (in ascending order).

In addition, girls outperformed boys in reading at both extremes of the performance distribution. The weakest-performing girls outperformed the weakest-performing boys on average across OECD countries (34 score points difference) and in all countries/economies. Similarly, the highest-performing girls outperformed the highest-performing boys on average across OECD countries (14 score points difference) and in most countries/economies (Figure I.4.8).

Figure I.4.8. Gender gap in reading performance

Score-point difference in reading between boys and girls

** Caution is required when comparing estimates based on PISA 2022 with other countries/economies as a strong linkage to the international PISA reading scale could not be established (see Reader's Guide and Annex A4).
Notes: The mean score in reading is shown next to the country/economy name.
Statistically significant differences are shown in a darker tone (see Annex A3).
Countries and economies are ranked in descending order of the score-point difference in reading related to gender (boys minus girls).
Source: OECD, PISA 2022 Database, Tables I.B1.2.2 and I.B1.4.18.

Gender and low performance

Figure I.4.9 and Figure I.4.10 show the percentage of low performers in mathematics and reading by gender, respectively.

On average across OECD countries in 2022, 31% of boys and 32% of girls are low performers in mathematics (Figure I.4.9). In 17 countries and economies, more boys than girls are low performers in mathematics whereas more girls than boys scored below proficiency Level 2 in mathematics in 15 countries and economies.

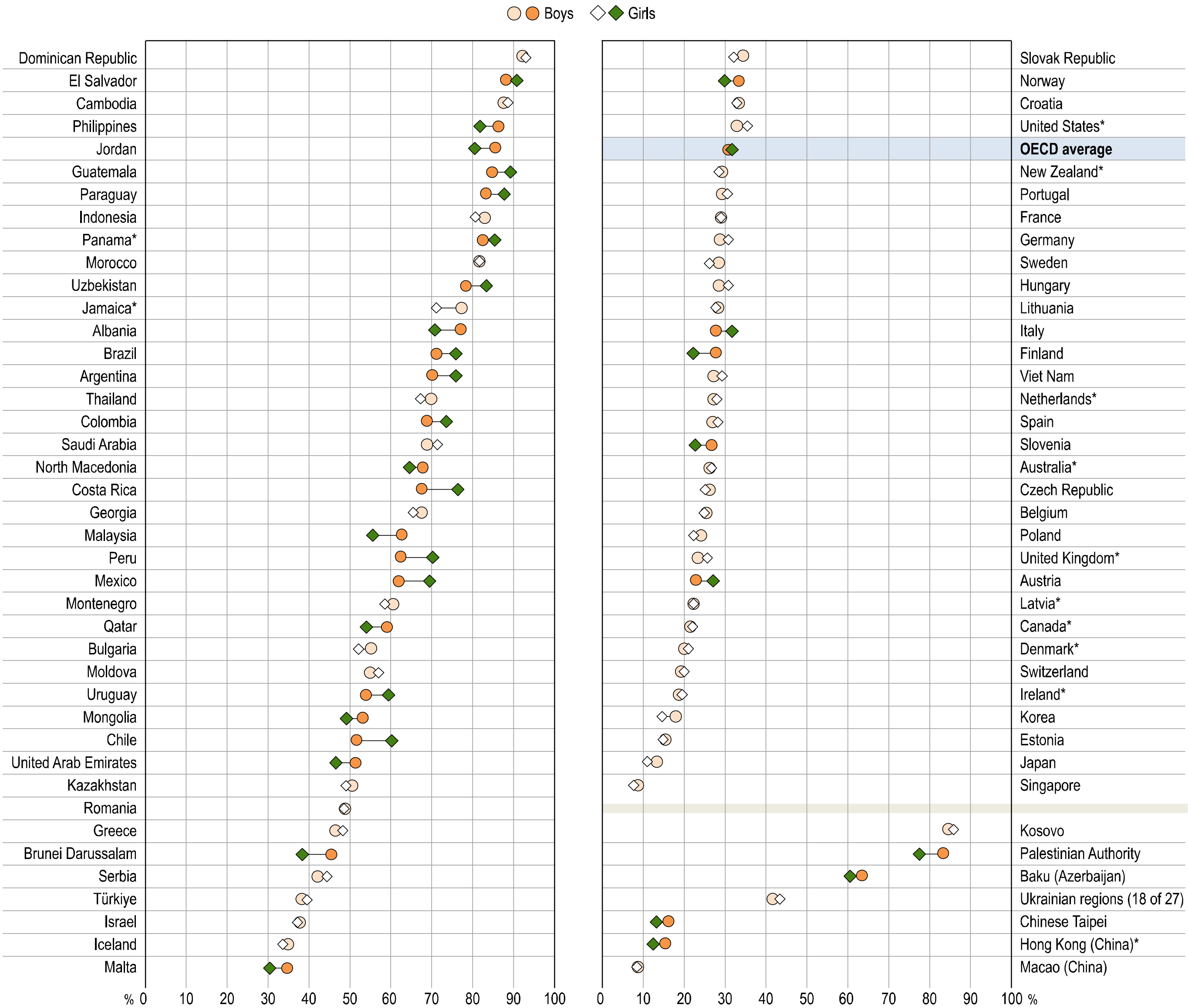
Gender gaps in the share of low performers in mathematics are relatively small. The widest gender gaps in low mathematics performance were observed in:

- Four countries and economies (Albania, Brunei Darussalam, Malaysia and Cyprus, in ascending order) where the share of boys who did not attain proficiency Level 2 is greater than the corresponding share of girls by more than six but less than nine percentage points.
- Four countries and economies (Mexico, Peru, Chile and Costa Rica, in ascending order) where the share of boys who did not attain proficiency Level 2 is smaller than the corresponding share of girls by more than six but less than nine percentage points.

In all other countries and economies, the difference between boys and girls in the share of low performers in mathematics is six percentage points or smaller, or is not statistically significant.

Figure I.4.9. Low performers in mathematics, by gender

Percentage of students who score below proficiency Level 2 in mathematics, by gender



Note: Statistically significant differences are shown in a darker tone (see Annex A3).

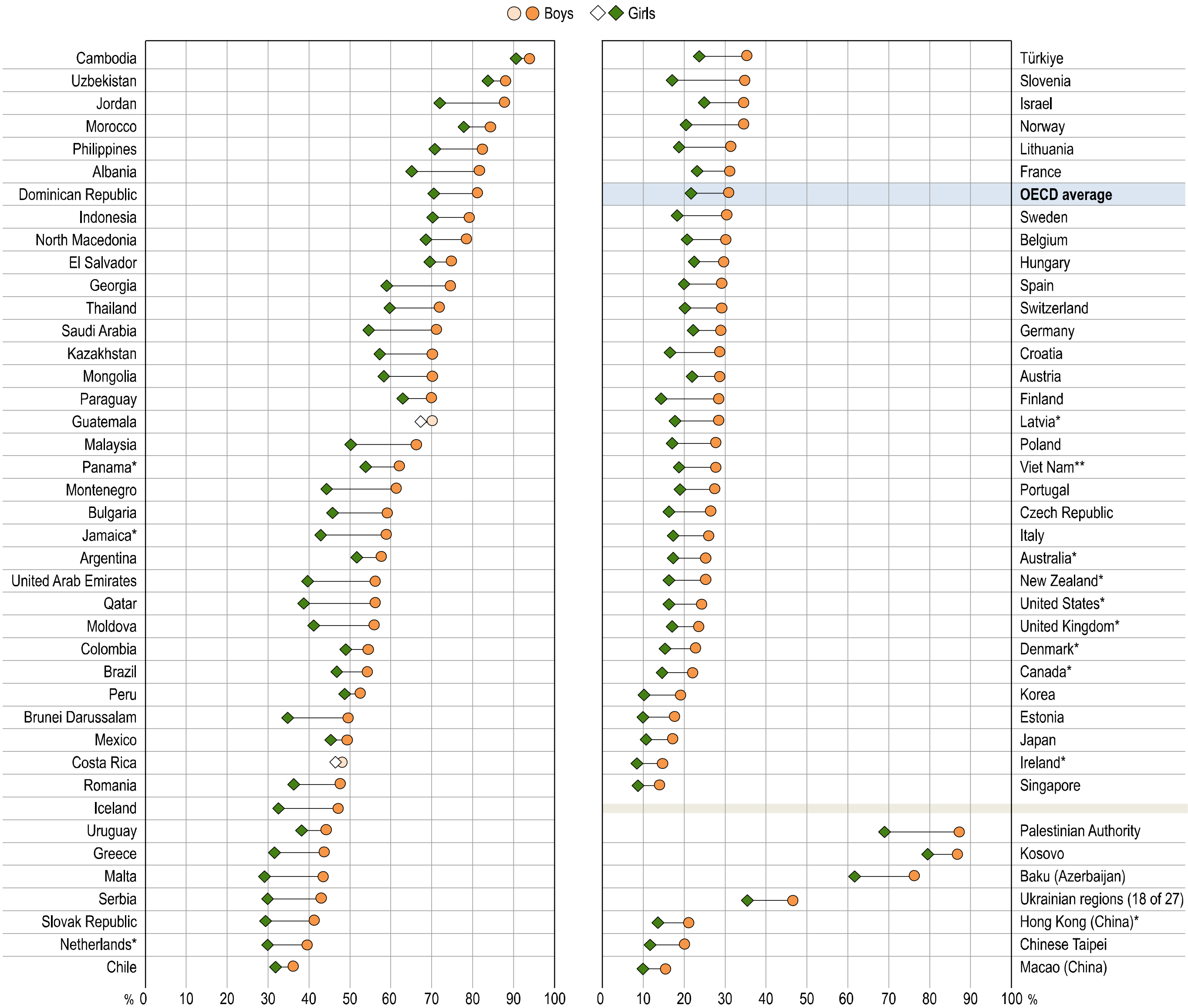
Countries and economies are ranked in descending order of the percentage of low-performing boys in mathematics.

Source: OECD, PISA 2022 Database, Table I.B1.4.31.

In reading, however, the picture is inverted and differences are more pronounced: boys performed significantly worse than girls in reading. On average across OECD countries in PISA 2022, 31% of boys and 22% of girls did not attain the baseline level of proficiency in reading, Level 2 (Figure I.4.10). In 78 out of 80 countries and economies in PISA 2022, a larger share of boys than girls are low performers in reading; in Montenegro, Qatar, Slovenia and Palestinian Authority (in ascending order) this difference is equal to or larger than 17 percentage points.

Figure I.4.10. Low performers in reading, by gender

Percentage of students who score below proficiency Level 2 in reading, by gender



Note: Statistically significant differences are shown in a darker tone (see Annex A3).

Countries and economies are ranked in descending order of the percentage of low-performing boys in reading.

Source: OECD, PISA 2022 Database, Table I.B1.4.32.

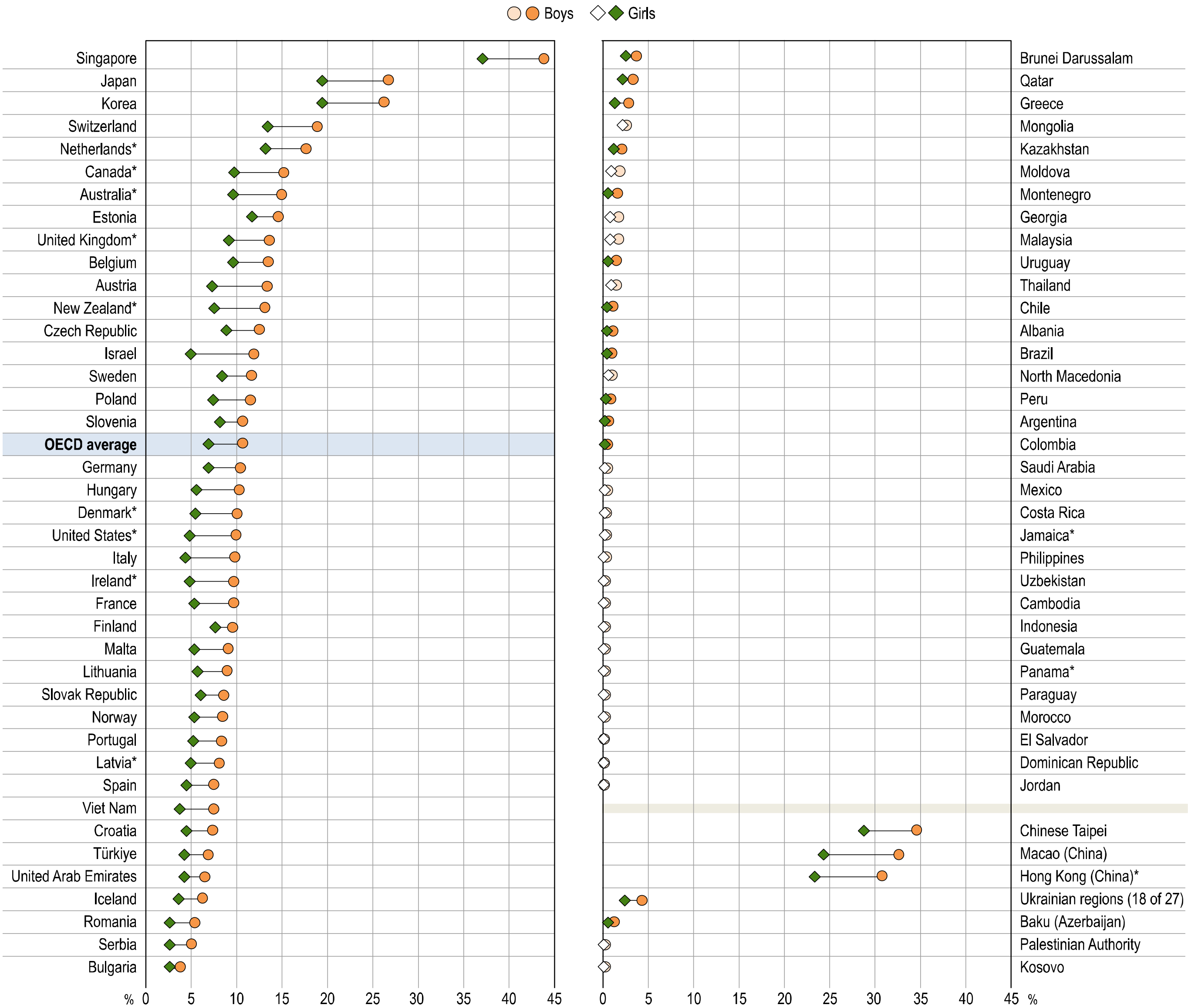
Gender and top performance

Some 11% of boys and 7% of girls scored at proficiency Level 5 or above in mathematics (Figure I.4.11) on average across OECD countries. In most countries and economies in PISA 2022, a larger share of boys than girls are top performers in mathematics. In most of these countries and economies the difference is small (i.e. equal to or lower than four percentage points) but in Japan, Hong Kong (China)* and Macao (China) (in ascending order) the share of top performers is between seven and nine percentage points more among boys than girls.

There is no country in PISA 2022 where the share of top performers in mathematics is larger among girls than boys.

Figure I.4.11. Top performers in mathematics, by gender

Percentage of students who score at proficiency Level 5 or above in mathematics, by gender



Note: Statistically significant differences are shown in a darker tone (see Annex A3).

Countries and economies are ranked in descending order of the percentage of top-performing boys in mathematics.

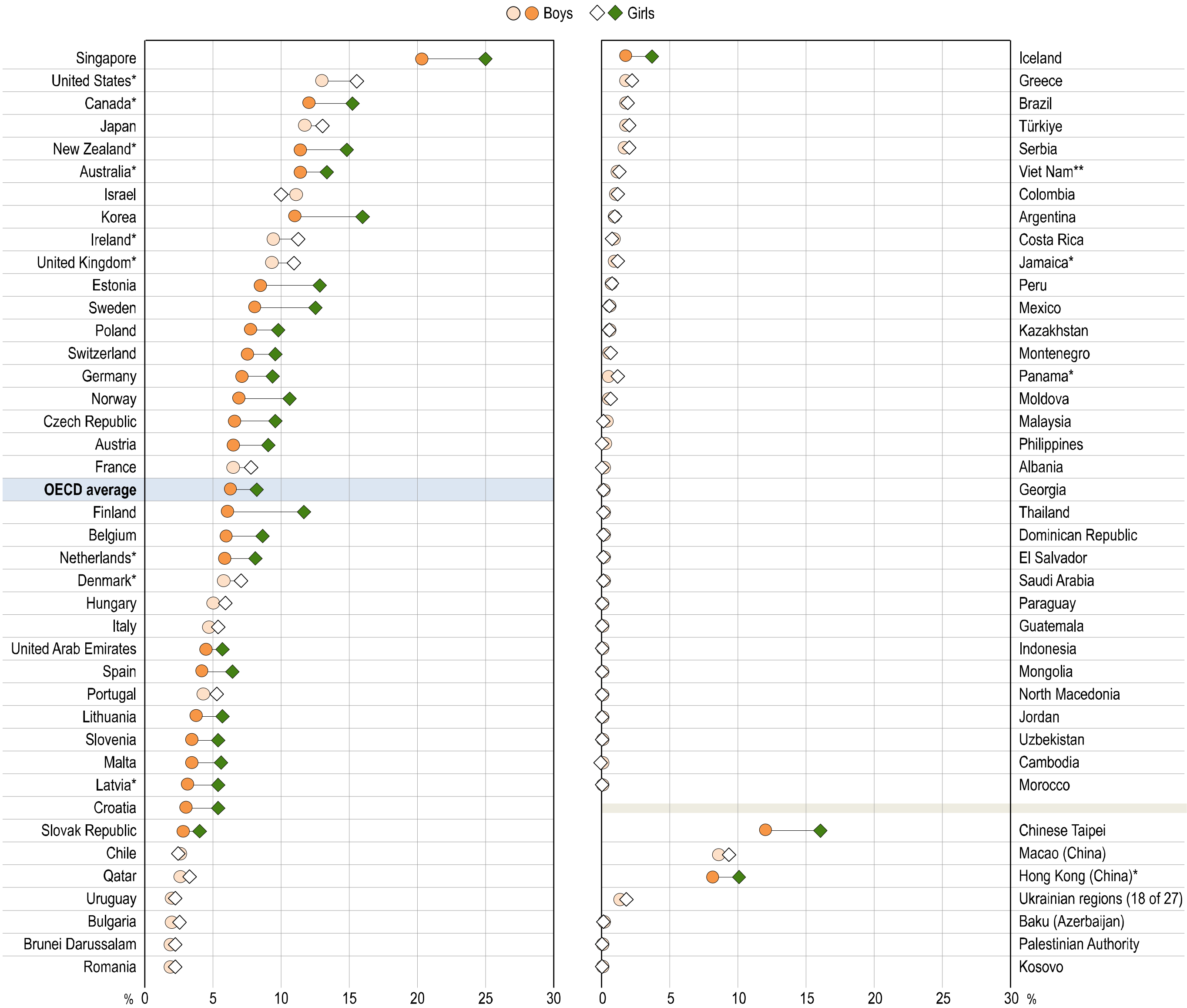
Source: OECD, PISA 2022 Database, Table I.B1.4.31

An average of 6% of boys and 8% of girls scored at proficiency Level 5 or above in reading (Figure I.4.12) in OECD countries. In 28 countries and economies a larger share of girls than boys are top performers in reading; only in Finland and Korea is this difference larger than five percentage points.

In most countries and economies, the difference between boys and girls in the share of top performers in reading is not statistically significant. In no country/economy is the share of top performers in reading larger among boys than girls.

Figure I.4.12. Top performers in reading, by gender

Percentage of students who score at proficiency Level 5 or above in reading, by gender



** Caution is required when comparing estimates based on PISA 2022 with other countries/economies as a strong linkage to the international PISA reading scale could not be established (see Reader's Guide and Annex A4).
Note: Statistically significant differences are shown in a darker tone (see Annex A3).
Countries and economies are ranked in descending order of the percentage of top-performing boys in reading.
Source: OECD, PISA 2022 Database, Table I.B1.4.32

Box I.4.3. Should education policies target students or schools?

PISA can help policy makers design evidence-based strategies and interventions to raise performance and improve equity in their education systems. According to a policy framework developed in previous PISA reports (hereafter, this will be referred to as "PISA policy framework") (OECD, 2004[30]; OECD, 2004[31]; OECD, 2016[32]), PISA data can inform whether *universal* or *targeted* policies are more likely to have a stronger impact on a particular education system. It can also indicate whether targeted policies might want to focus on low-performing or socio-economically disadvantaged students or both.

This box builds on the PISA policy framework by addressing a question that policy makers interested in targeted policies are confronted with: should students or schools be targeted? This requires examining the level of concentration of low-performing and disadvantaged students in schools.

The PISA policy framework: Universal or targeted education policies?

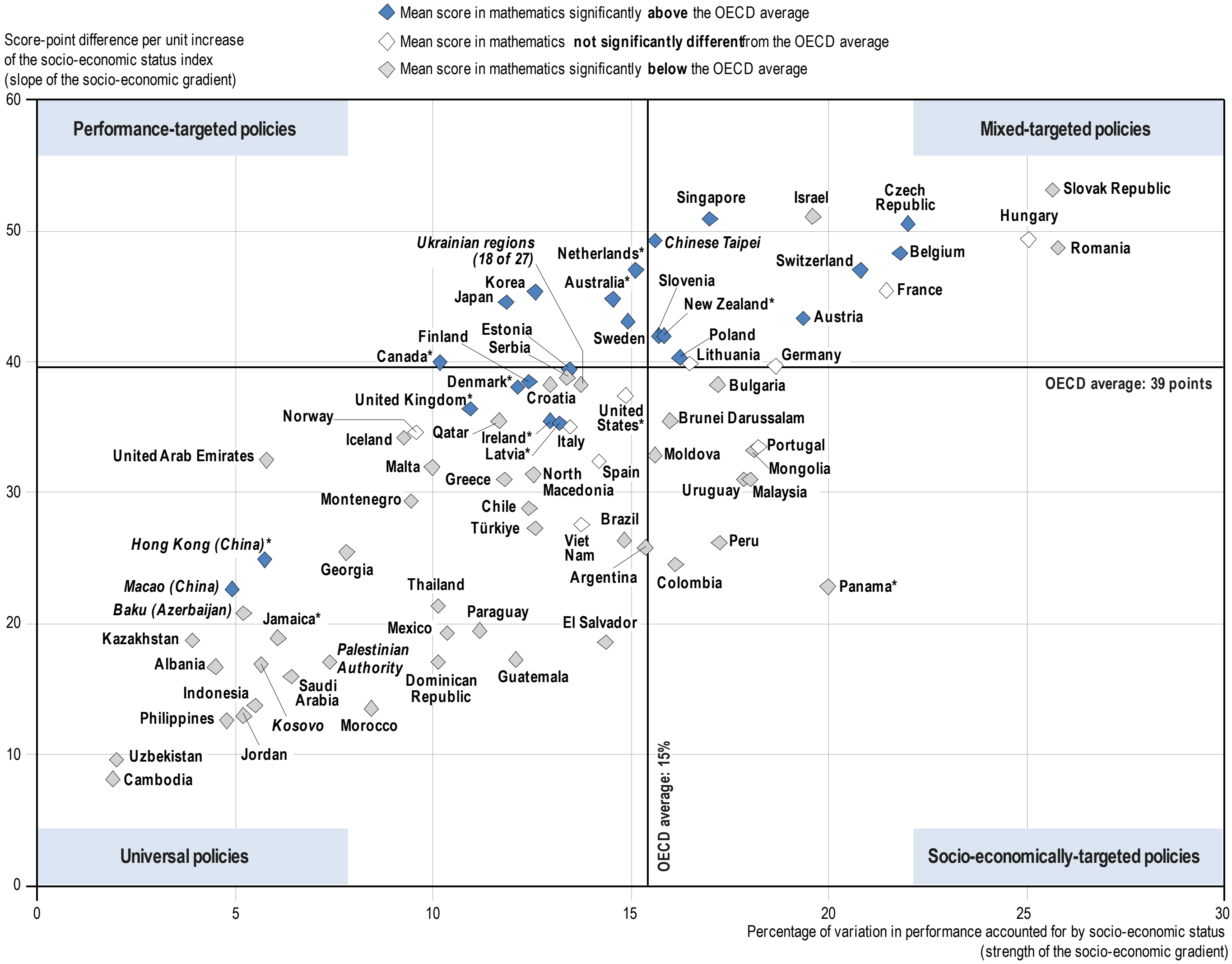
The PISA policy framework identifies education systems that can benefit the most from universal or targeted policies. To do this, two key pieces of information are used: (1) the strength of the socio-economic gradient, i.e. the proportion of the variation in student performance that is accounted for by differences in student socio-economic status and the (2) the slope of the socio-economic gradient, i.e. the score-point difference in student performance associated with an increase of one unit in the PISA index of socio-economic status. Understanding how these two aspects interact can inform educational policies and interventions.

Table I.4.1 shows four types of policy according to each possible combination of slope and strength. Figure I.4.13 locates into this typology the countries/economies that took part in PISA 2022.

Table I.4.1. The PISA policy framework

		Strength of the socio-economic gradient	
		Low	**High**
Slope of the socio-economic gradient	**Steep**	**Performance-targeted** policies	**Mixed targeted** policies
	Flat	**Universal** policies	**Socio-economically-targeted** policies

Figure I.4.13. Strength and slope of the socio-economic gradient



Notes: Only countries and economies with available data are shown.
The socio-economic status is measured by the PISA index of economic, social and cultural status.
Source: OECD, PISA 2022 Database, Tables I.B1.2.1 and I.B1.4.3.

The framework is built around the OECD average. As Figure I.4.13 shows, it is not always easy to describe strength as strong or weak, or slope as flat or steep. Whether systems fall into one category or another is sometimes not clear-cut as many countries are close to the OECD average. In such cases, a mix of approaches or policies may be most appropriate.

Universal policies are more appropriate in education systems where student socio-economic status does not have a great impact on student performance; that is, where the strength of the relationship between student performance and socio-economic background is comparatively weak (i.e. the proportion is lower than the OECD average) and the slope is flat (i.e. the score-point difference is smaller than the OECD average). Universal policies aim to improve performance across the board and raise educational attainment for all children through reforms that are applied equally across the system. This includes, for example, the development and implementation of comprehensive curricula or the provision of continuous professional development and training for teachers to improve their subject knowledge, pedagogical skills and strategies for teaching students of different abilities. Ensuring that all schools have access to quality teaching materials, textbooks, digital resources and technology to support effective teaching is essential. As shown in Figure I.4.13, 47 countries/economies that took part in PISA 2022 can benefit from universal policies. Among high-performing countries/economies, they are most likely to be effective in Hong Kong (China)* and Macao (China).

By contrast, targeted policies are those that focus on particular groups of students. Three types of targeted policies are considered in the PISA policy framework: those that focus resources and efforts on low-performing students ("performance-targeted") or socio-economically disadvantaged students ("socio-economically-targeted") or both ("mixed"). Examples of these policies are given below, but they need to be weighed up against each national context and, if necessary, adapted.

Targeted policies: Students or schools?

Effective education policies strike a balance between targeting schools and individuals. While schools play a crucial role in delivering education and ensuring equitable opportunities, addressing the diverse needs of individual students is equally important. Yet, as education systems face new challenges in the wake of the COVID-19 pandemic, there is a need to invest resources efficiently. One way to do so is to identify whether targeted policies should, as a first step, prioritise individual students or whole schools.

To distinguish priorities within countries, two PISA 2022 indices are used: the index of academic inclusion and the index of social inclusion. A higher value in the index of academic inclusion indicates that students with different levels of performance tend to be more evenly distributed across schools, hence, that academic diversity within schools is greater. A lower value in the index of academic inclusion indicates that students are less evenly distributed, i.e. that low performers and top performers tend to be concentrated in particular schools within the education system (Table I.B1.2.13). Likewise, when the index of social inclusion is higher, social inclusion at school is greater and schools tend to be more socially heterogeneous. The opposite is true when the index is low (Table I.B1.4.41). Based on these two indices, this box identifies priority groups for each of the following targeted policies.

Table I.4.2. Targeted policies by level of social and academic inclusion within schools

Performance-targeted policies		Socio-economically-targeted policies		Mixed targeted policies	
Target low-performing schools (IAI < OECD average)	**Target low-performing students** (IAI > OECD average)	**Target disadvantaged schools** (ISI < OECD average)	**Target disadvantaged students** (ISI > OECD average)	**Schools** (ISI & IAI < OECD average)	**Students and schools** (ISI > OECD average & IAI < OECD average)
Japan, Lithuania, the Netherlands*, Poland, Slovenia, Chinese Taipei	Australia*, Canada*, Korea, New Zealand*, Sweden	Bulgaria, Colombia, Malaysia, Mongolia, Panama*, Peru, Uruguay	Portugal	Austria, Belgium, the Czech Republic, France, Hungary, Israel, Romania, the Slovak Republic	Singapore, Switzerland

Note: IAI is the index of academic inclusion and ISI is the index of social inclusion.
Source: OECD, PISA 2022 Database, Tables I.B1.2.13 and I.B1.4.41.

Performance-targeted policies: These policies aim to improve the performance of the lowest performers, regardless of their socio-economic status. The goal is to provide equal learning opportunities for all students and specialised or additional teaching resources based on students' academic performance. Performance-targeted policies start by setting specific, measurable, and achievable academic performance goals for students, schools or groups of schools. Once areas for improvement have been identified, schools implement targeted interventions – and early intervention is important. These can take a variety of forms, including additional instructional support (extra tutoring, mentoring or academic support for struggling students) or professional development for teachers and staff. While in-school interventions are the most common approaches, evidence suggests that reducing student tardiness and absenteeism has important results in some countries (OECD, 2018[33]). For this, parental involvement is key. In other contexts, targeted academic support combined with merit-based scholarship programmes have success in motivating low-achieving students. They also have positive spin-off effects in classrooms and schools (Kremer, Miguel and Thornton, 2009[34]).

As shown in Table I.4.2, 11 education systems that took part in PISA 2022 would benefit from performance-targeted-policies. Yet, would it make more sense for them to target low-performing students or low-performing schools? The PISA index of academic inclusion suggests that countries in this group are almost equally divided between those who might focus on schools first (i.e. the concentration of low-performing students in particular schools is higher than on average across OECD countries) and those that might want to focus on individual students first (i.e. the concentration of low-performing students in particular schools is lower than on average across OECD countries).

Socio-economically-targeted policies: These policies aim to compensate for educational inequalities by providing additional resources, support or assistance to disadvantaged students and schools. In some countries, for example, increased teaching hours and teacher-student contact time have been used to compensate for the support disadvantaged students may lack at home (Rodríguez Navarro, Ríos González and Racionero Plaza, 2012[35]). These also accelerate learning. Other policy levers are more holistic and target inequalities beyond the classroom ranging from free school meals and free textbooks for disadvantaged students to direct financial support for disadvantaged families.

As shown in Table I.4.2, eight education systems would likely benefit the most from socio-economically-targeted policies. These are systems in which the socio-economic profile of students is strongly associated with their performance in school even though the score-gap is not too large. Would it make more sense for them to target disadvantaged students or schools with a disadvantaged socio-economic profile? In seven out of the eight countries in this group, the school concentration of disadvantaged students is higher than average: policies targeting disadvantaged schools are likely to have a stronger impact. The exception is Portugal, where disadvantaged students are spread more widely across the school system.

Mixed targeted policies: The aim of these policies is to reduce the achievement gap through targeted policies that provide adapted teaching resources to address both low achievement and socio-economic disadvantages. For example, some countries in this group could benefit from better support for teachers and professional development, including efforts to attract and retain qualified teachers in schools in disadvantaged areas. Funding policies that allocate more resources to schools in low-income neighbourhoods are also important, as is the implementation of school integration programmes that promote diversity; that is, where schools are attended by pupils with different learning paths and from different socio-economic backgrounds. For example, evidence suggests that the composition of the student body in a classroom can academically motivate and improve the well-being of socio-economically disadvantaged students (Hornstra et al., 2015[36]). Schools that succeed in addressing the specific educational needs of socio-economically disadvantaged and/or low-performing students are often those that succeed in creating a positive mixed learning environment in addition to programmes that provide material or financial support to pupils who need it. Other strategies that could be relevant in some countries include specialised teacher training and professional development programmes as well as continuous monitoring of changes in academic performance and the overall impact of policies.

Ten education systems that took part in PISA 2022 would likely benefit the most from a mix of performance-targeted and socio-economically-targeted policies. In these systems, socio-economically disadvantaged pupils are particularly at risk, as there is a strong relationship between mathematics performance and socio-economic background, and the performance loss (slope) is pronounced. Evidence from PISA 2022 suggests that eight countries in this group may find more value in targeting schools, as both indices suggest high levels of social and academic segregation. Only in two high-performing countries in this group, Switzerland and Singapore, are students from disadvantaged backgrounds more evenly distributed across schools than on average across OECD countries.

Equal opportunity in terms of education system

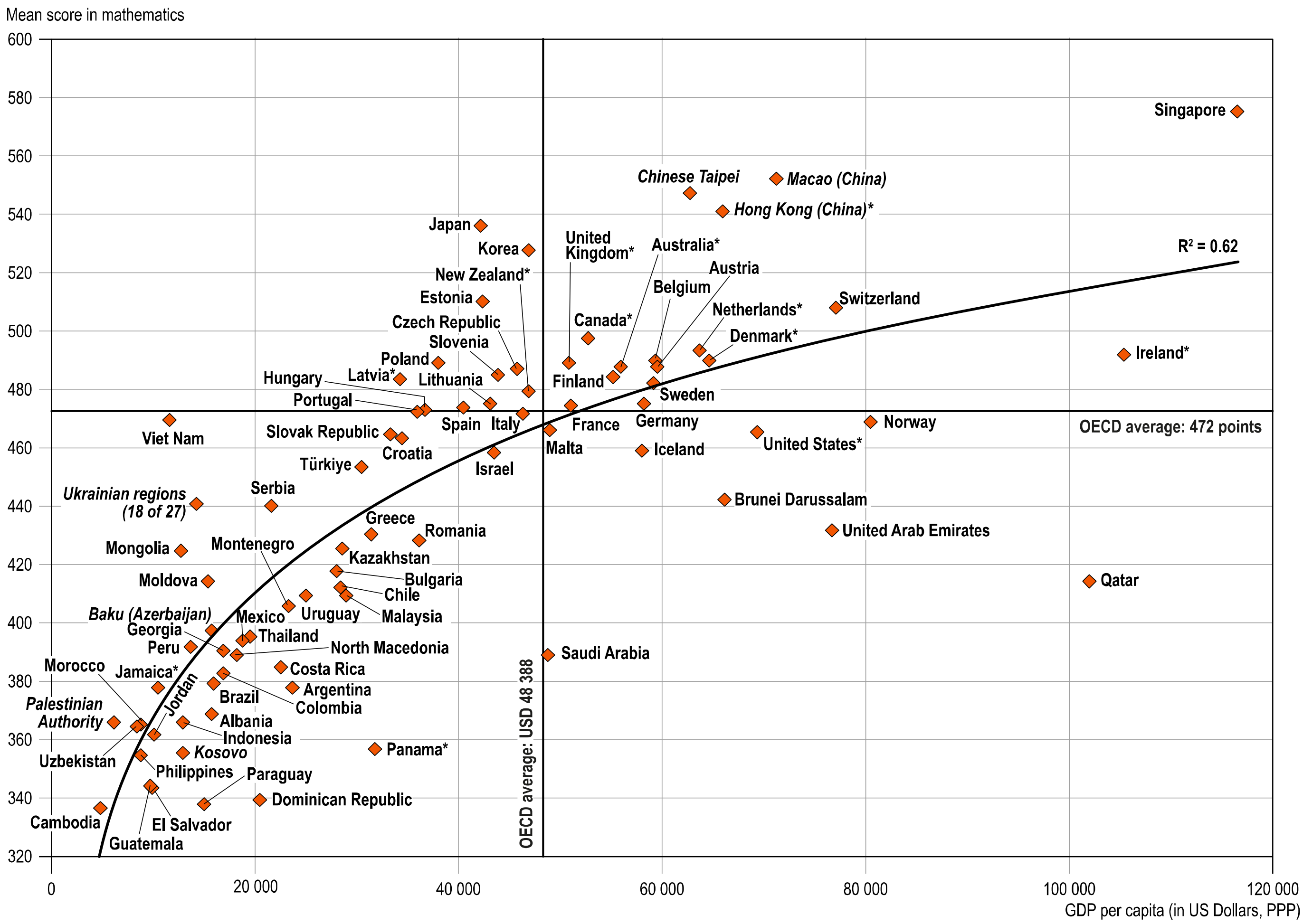
Barriers to student performance that compromise fairness arise not only within countries/economies but also between countries/economies. Opportunities for students to fulfil their potential differ greatly across countries and economies that participated in PISA. Students who are born and attend school in education systems that are more conducive for learning are more likely, on average, to perform at higher levels than students in systems that are less so. As most students cannot select an education system they are enrolled in for better opportunity, equality of opportunity by education system is examined in this report as an attribute of fairness in education.

Countries' economic and social conditions, and student performance

The economic and social conditions of different countries/economies, which are often beyond the control of education policy makers and educators, can influence student performance. For example, the relative prosperity of some countries allows them to spend more on education while other countries find themselves constrained by a lower national income. It is therefore important to keep the national wealth of countries in mind when interpreting the performance of education systems across countries.

Figure I.4.14 shows the relationship between national income as measured by per capita GDP and students' average mathematics performance. The figure also shows a trend line that summarises this relationship. The relationship suggests that 62% of the variation in countries'/economies' mean scores is related to per capita GDP (47% in OECD countries). Countries with higher national incomes tend to score higher in PISA. However, the relationship is not linear and it flattens towards the right. When interpreting this chart, keep in mind that it provides no indications about the causal nature of this relationship.

Figure I.4.14. Mathematics performance and per capita GDP



Source: OECD, PISA 2022 Database, Tables I.B1.2.1 and I.B3.2.1.

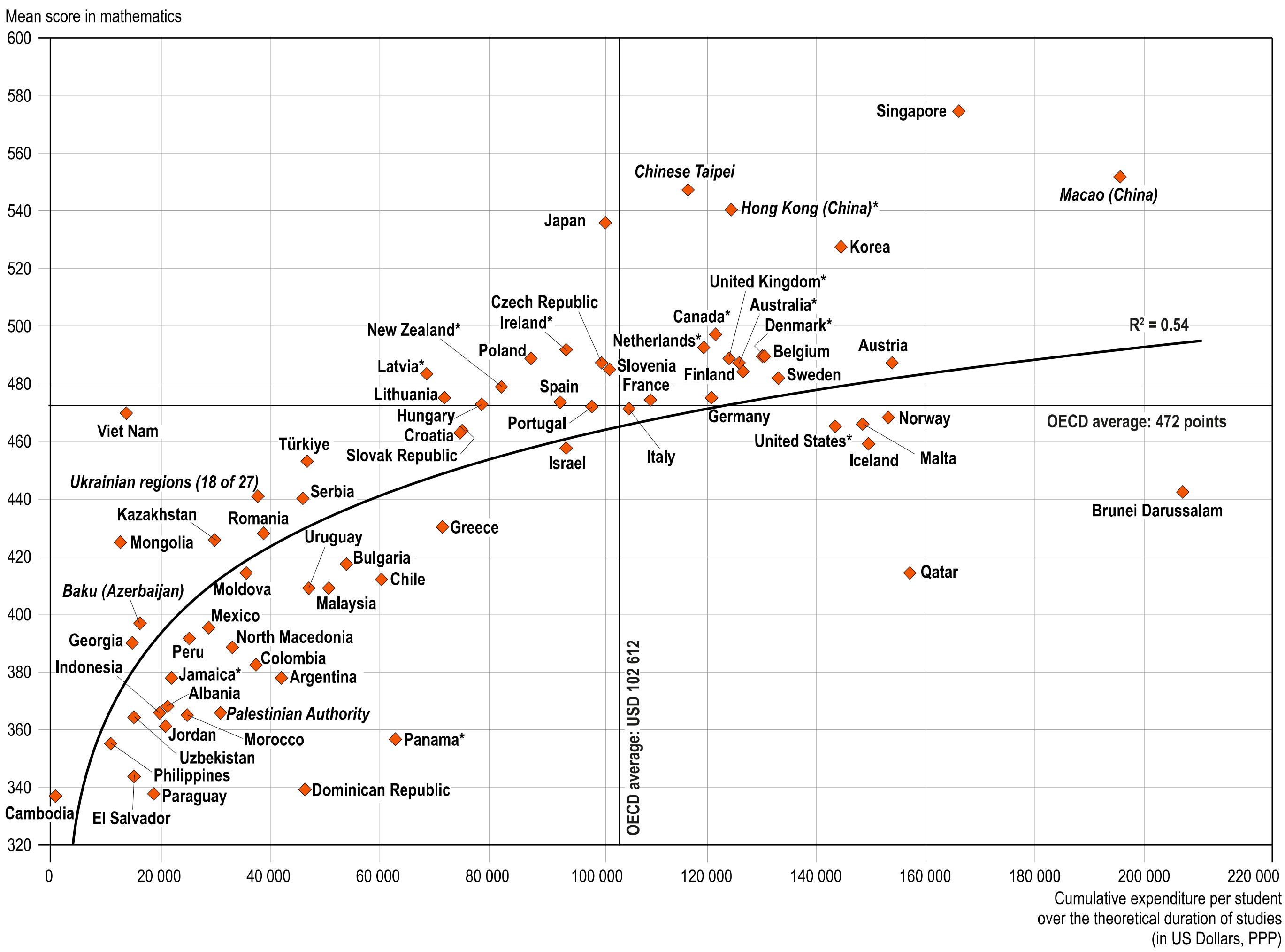
While per capita GDP reflects the potential resources available for education in each country, it does not directly measure the financial resources actually invested in education. Figure I.4.15 compares countries' cumulative spending per student from the age of 6 up to 15 after accounting for purchasing power parities (hereafter, spending per student) with average student performance in mathematics.

The figure shows a positive relationship between spending per student and mean mathematics performance until a certain threshold. Spending per student accounts for 54% of the variation in mean performance between countries/economies (51% in OECD countries). As spending per student increases, so does a country's mean performance. But this rate of increase diminishes quickly. Above USD 75 000 per student, a level of cumulative expenditure reached by all OECD countries except Chile, Colombia, Greece, Latvia, Lithuania, Mexico and Türkiye, spending is much less related to performance.

Low spending per student needs to be taken into account when interpreting the poor performance of students in developing countries. Average spending per student across OECD countries (USD 102 612) is about seven times greater than in El Salvador, more than eight times greater than in Mongolia, and more than nine times greater than in the Philippines. This shows that education needs to be adequately resourced and is often under-resourced in developing countries.

At the same time, after a certain threshold of spending, a higher level of spending per student does not automatically translate into excellence in education. For example, the six East Asian education systems (Hong Kong [China]*, Japan, Korea, Macao [China], Singapore and Chinese Taipei) that outperformed all other countries/economies in mathematics in PISA 2022 differ markedly in their spending per student (yet all of them spend more than USD 100 000 per student). Similarly, countries and economies with the highest levels of spending per student differ widely in their mean student performance; in Brunei Darussalam and Qatar, mean performance in mathematics is below the OECD average despite high levels of spending per student.

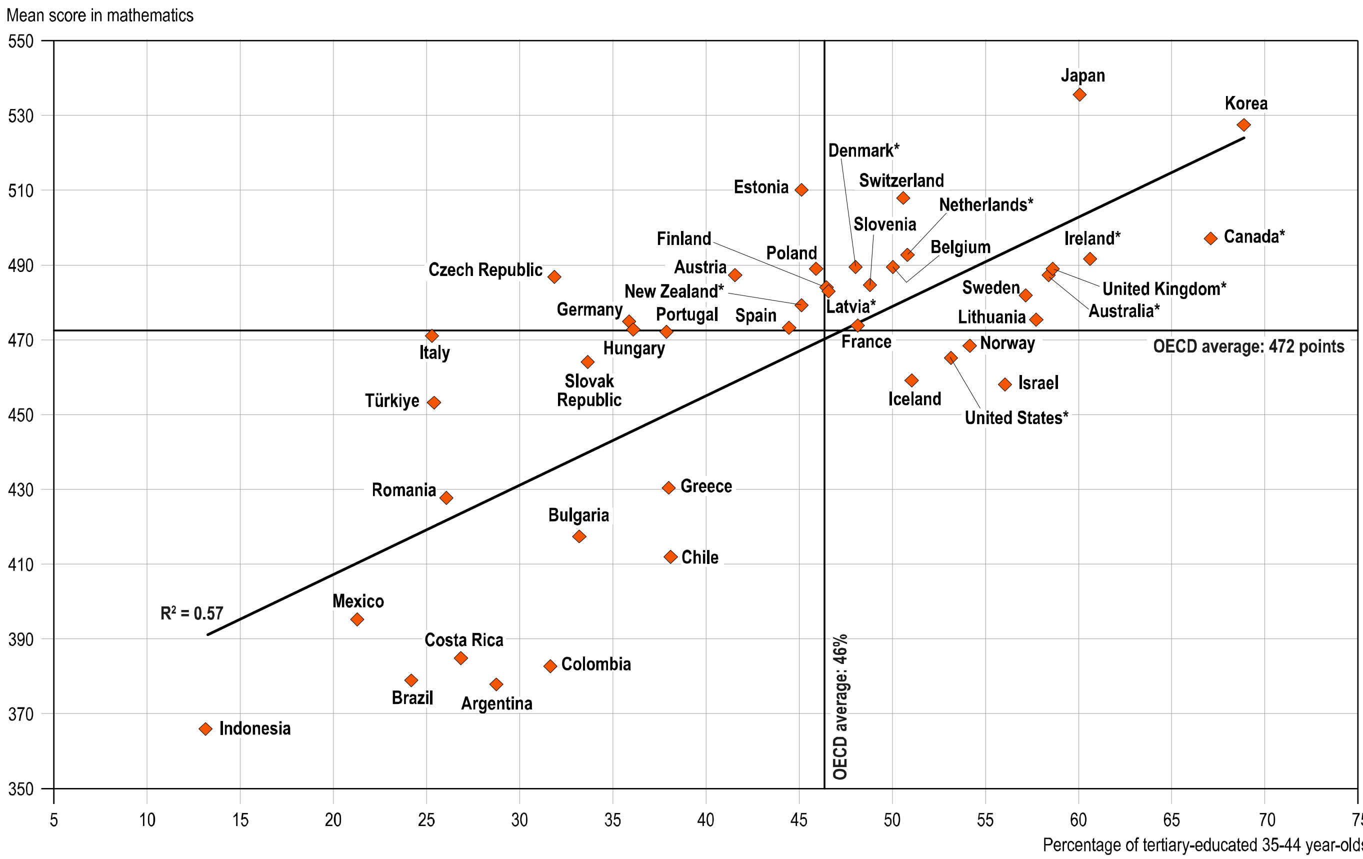
Figure I.4.15. Mathematics performance and spending on education



Note: Only countries and economies with available data are shown.
Source: OECD, PISA 2022 Database, Tables I.B1.2.1 and I.B3.2.2.

Given the strong relationship between a student's performance in PISA and his or her parents' level of education (as measured by their education qualifications), the education attainment of adult populations should be taken into account when comparing student performance across countries. Countries with more highly educated adults are at an advantage over countries where parents have less education. Figure I.4.16 shows the relationship between mean mathematics performance and the percentage of 35-44 year-olds who have attained tertiary education. This group corresponds roughly to the age group of parents of the 15-year-olds assessed in PISA. According to this analysis, the share of tertiary-educated 35-44 year-olds accounts for 57% of the variation in 15-year-old students' mean mathematics performance across 42 countries/economies with available data (43% across 37 OECD countries).

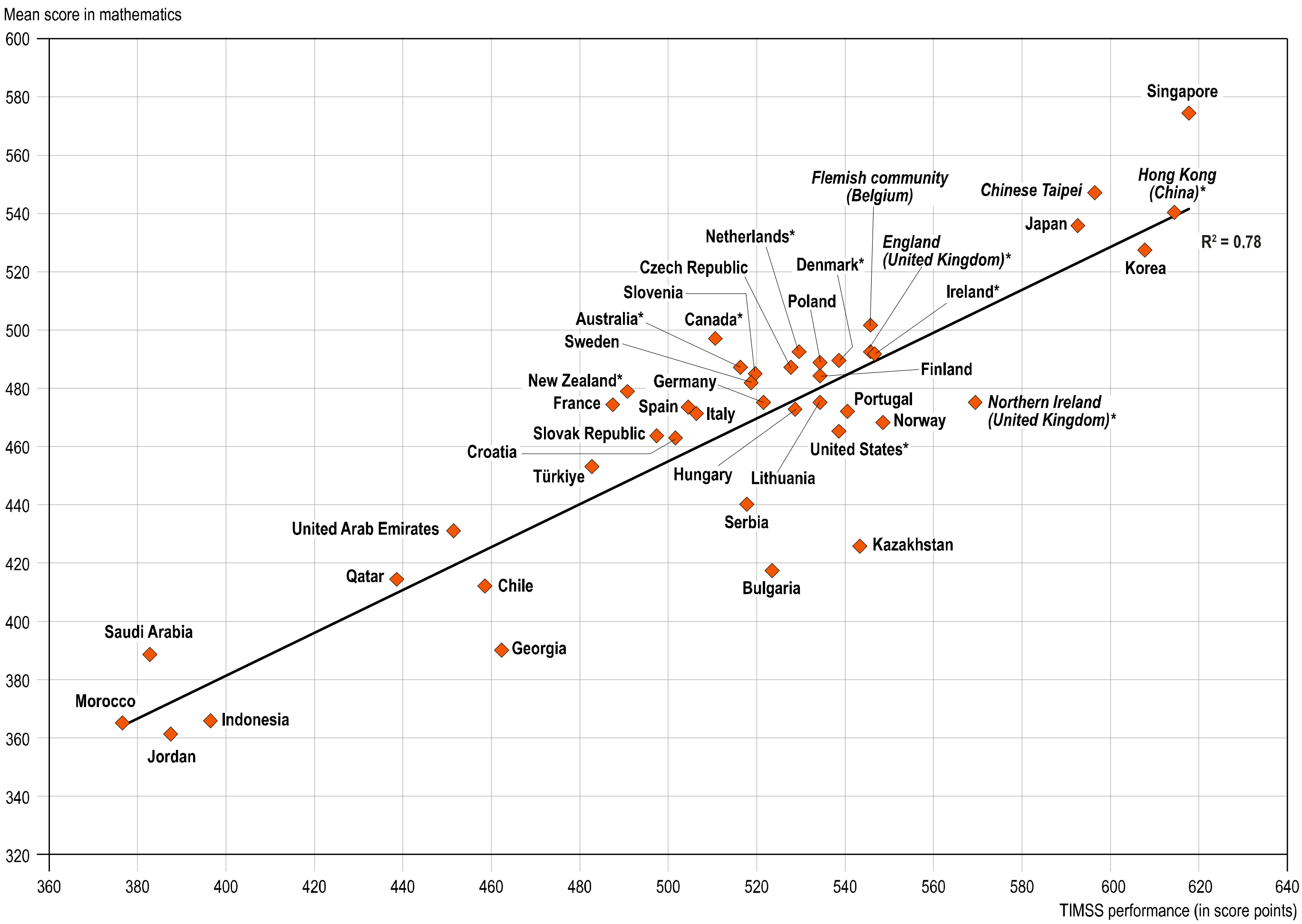
Figure I.4.16. Mathematics performance and educational attainment among 35-44 year-olds



Notes: Only countries and economies with available data are shown.
For Chile, year 2020 was used rather than year 2022.
For Argentina, year 2021 was used rather than year 2022.
Source: OECD, PISA 2022 Database, Tables I.B1.2.1; OECD (2023) Education at a Glance 2023: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/e13bef63-en.

When interpreting the performance of 15-year-olds in PISA, it is important to consider that the results reflect more than the quality of secondary schooling. They also reflect the quality of learning in earlier stages of schooling, and the cognitive, emotional and social competences students had acquired before they even entered school. A clear way of showing this is to compare the mean mathematics performance of 15-year-olds in PISA 2022 with the average mathematics performance achieved towards the end of primary school by students from a similar birth cohort who participated in the Trends in International Mathematics and Science Study (TIMSS) in 2015, a study developed by the International Association for the Evaluation of Educational Achievement (Mullis et al., 2016[37])[8]. Some 43 countries, economies and subnational entities that participated in PISA 2022 also participated in TIMSS 2015. Figure I.4.17 shows a strong correlation between the results of the mathematics test for fourth-grade students in TIMSS 2015 and the results of the PISA 2022 mathematics assessment among 15-year-old students. Differences in TIMSS results can account for about 78% of the variation in PISA mathematics results across the 43 countries and economies that participated both in TIMSS 2015 and PISA 2022. Despite this clear relationship, countries that scored at similar levels in TIMSS – such as Hungary and the Netherlands – can have very different mean scores in PISA. Differences between PISA and TIMSS in countries' relative standing may reflect the influence of the intervening grades on performance but could also be related to differences in what is measured and who is assessed.

Figure I.4.17. Mathematics performance and fourth-graders' performance in TIMSS 2015



Notes: Only countries and economies with available data are shown.

For Norway, 5th-grade achievement was used rather than 4th-grade achievement.

Source: OECD, PISA 2022 Database, Table I.B1.2.1, (Mullis et al., 2016[37]), TIMSS 2015 International Results in Mathematics, http://timss2015.org/timss-2015/mathematics/student-achievement/distribution-of-mathematics-achievement/

International deciles of student socio-economic status and mean performance

The PISA index of economic, social and cultural status (ESCS index) is computed in such a way that all students taking the PISA test, regardless of the country where they live, can be placed on the same socio-economic scale. This means that it is possible to use this index to compare the performance of students of similar socio-economic background in different countries. Figure I.4.18 shows performance differences by international deciles of the ESCS index. The figure illustrates that though students may have similar socio-economic status, their performance is very much linked to the country or economy in which they live.

For instance, in Macao (China), students with the greatest disadvantages (i.e. those in the bottom decile of the international distribution of the ESCS index) have an average score of 495 points in the mathematics assessment (1% of students in Macao [China] are in the bottom decile of the international distribution of the ESCS index). This is significantly above the OECD mean score of 472 points, which reflects the performance of students from all socio-economic backgrounds. Such a high level of performance also means that disadvantaged students in Macao (China) outperformed even the most advantaged students (i.e. those in the top decile of the international distribution of the ESCS index) in many other PISA-participating countries and economies.

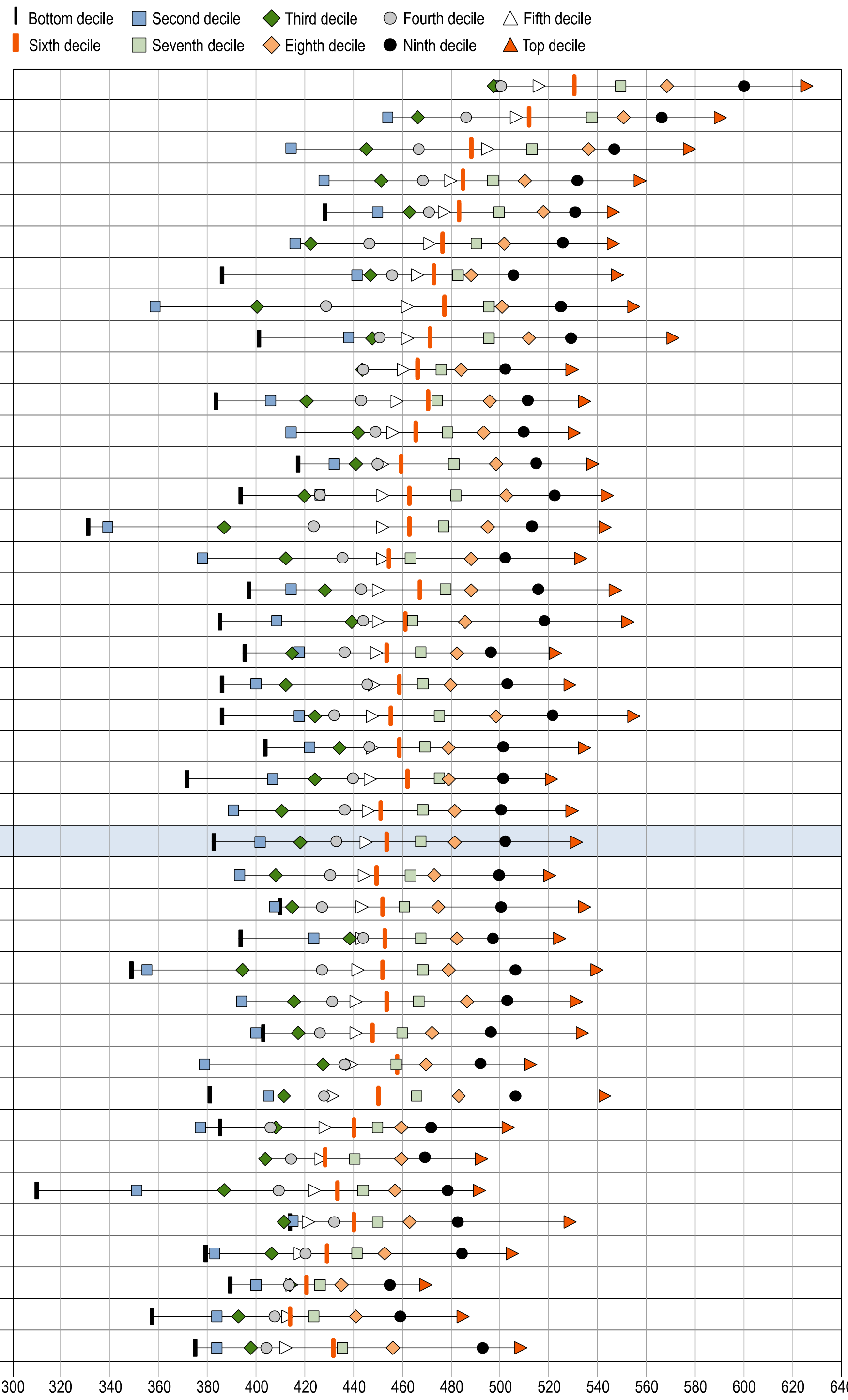
Large differences in performance can also be observed between countries where similar percentages of students have similar socio-economic status. For instance, in Finland, the Netherlands*, New Zealand* and Slovenia, between 26% and 27% of students are in the internationally most socio-economically advantaged group. Yet, the average mathematics score of these most advantaged students in the Netherlands (551 score points) is about 20 points higher than in the other three countries.

Possible explanations for why students of a similar socio-economic status perform better in some countries are the differences in how education systems are organised and use the resources available to them. *PISA 2022 Results, Volume II* analyses education policies and practices in PISA-participating countries/economies.

Figure I.4.18. Mean performance in mathematics, by international decile of socio-economic status [1/2]

PISA index of economic, social and cultural status (ESCS)

	Bottom (%)	Top (%)
Singapore	0	26
Japan	0	10
Korea	0	23
Estonia	0	21
Viet Nam	16	2
Poland	0	17
United Kingdom*	1	22
Czech Republic	0	16
Switzerland	1	25
Ireland*	0	29
Canada*	0	29
Latvia*	0	15
Türkiye	16	4
Austria	1	22
Slovak Republic	2	13
Slovenia	0	26
Germany	2	19
Netherlands*	1	26
Denmark*	0	34
Finland	0	26
Belgium	1	22
Portugal	3	20
Italy	1	17
Lithuania	0	20
OECD average	2	21
Croatia	0	12
Australia*	0	33
Spain	2	20
Hungary	1	22
New Zealand*	1	27
Sweden	1	30
Malta	1	22
France	1	19
Norway	1	39
Iceland	0	29
Serbia	1	10
United States*	2	22
Brunei Darussalam	1	13
Kazakhstan	1	4
Greece	1	13
Mongolia	7	4

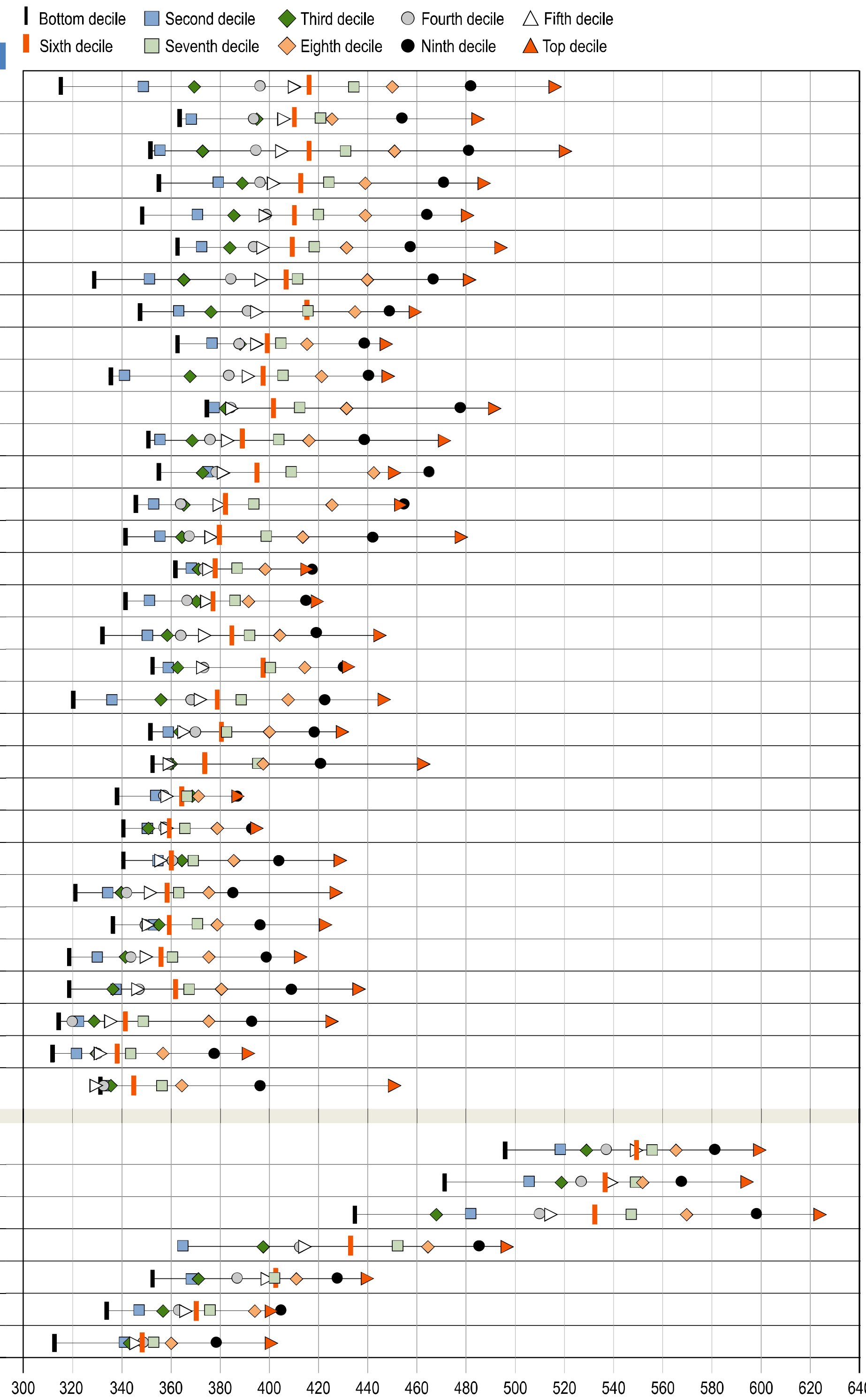


Notes: Only countries and economies with available data are shown.
Percentage of students who are in the top/bottom international decile of the PISA index of economic, social and cultural status are shown next to the country/economy name.
Countries and economies are ranked in descending order by fifth decile of international students' socio-economic status.
Source: OECD, PISA 2022 Database, Tables I.B1.4.7 and I.B1.4.11.

Figure I.4.18. Mean performance in mathematics, by international decile of socio-economic status [2/2]

PISA index of economic, social and cultural status (ESCS)

	Bottom (%)	Top (%)
Romania	2	13
Chile	2	7
Israel	1	29
Uruguay	9	7
Moldova	2	6
Malaysia	5	7
Bulgaria	3	12
Peru	16	4
Mexico	11	5
Montenegro	1	10
Thailand	17	2
Colombia	15	5
United Arab Emirates	0	18
Qatar	1	14
Brazil	12	4
Saudi Arabia	4	10
Jamaica*	3	6
Argentina	9	7
Georgia	1	6
North Macedonia	1	10
Indonesia	23	1
Morocco	34	2
Uzbekistan	5	3
Jordan	7	4
Albania	7	6
Guatemala	30	4
Philippines	18	1
El Salvador	22	3
Panama*	16	6
Paraguay	22	5
Dominican Republic	5	4
Cambodia	40	1
Macao (China)	1	8
Hong Kong (China)*	2	11
Chinese Taipei	1	12
Régions ukrainiennes (18 sur 27)	1	6
Baku (Azerbaijan)	2	6
Palestinian Authority	8	2
Kosovo	2	7



Notes: Only countries and economies with available data are shown.

Percentage of students who are in the top/bottom international decile of the PISA index of economic, social and cultural status are shown next to the country/economy name.

Countries and economies are ranked in descending order by fifth decile of international students' socio-economic status.

Source: OECD, PISA 2022 Database, Tables I.B1.4.7 and I.B1.4.11.

Inclusive education

In PISA, inclusion is the goal that all students have access to quality education and achieve at least the baseline level of skills in mathematics, reading and science. To attain equity in education, inclusion is necessary but not sufficient; inclusion needs to be combined with fairness to achieve equity in education.

Students who graduate from compulsory education without acquiring basic knowledge and skills are unlikely to do well in their adult life; and, when a large share of the population lacks basic skills, social and economic capital can be compromised (Pelinescu, 2015[38]). Therefore, in this report, the incidence of low-performance among 15-years olds (i.e. students who have not attained a baseline level of proficiency as measured by PISA) is examined. Similarly, students who drop out of school without completing secondary education are likely to be excluded from the benefits that education can provide.

While educational inclusion is a value that applies to all students regardless of their background, in practice it is more crucial for students from disadvantaged backgrounds or traditionally marginalised groups who are more likely to suffer from low educational attainment (i.e. early dropout) and poor proficiency in mathematics, reading and science. Education systems where most 15-year-olds are enrolled at school and have learned the basic skills needed to fully participate in society are considered as sufficiently inclusive.

In this report, the share of low-performing students in each country/economy is adjusted by the rate of school enrolment among 15-year-olds to produce estimates of acquisition of basic skills among all 15-year-olds, not only those who are in school. The acquisition of basic skills and the coverage of educational systems define the level of educational *inclusiveness* in a country and economy.

Percentage of 15-year-olds enrolled in school (coverage of education systems)

For children to benefit from education they must, at the very least, of course, have access to schooling. While enrolling all 15-year-olds in school does not guarantee that every student will develop the skills needed to thrive in an increasingly knowledge-intensive economy, it is a necessary step towards building a fairer and more inclusive education system.

Access is mainly reflected in school enrolment rates and dropout rates are an important metric. Students who have already left formal schooling by the age of 15 tend to perform less well on cognitive tests than those who remain at school (Spaull and Taylor, 2015[39]; Taylor and Spaull, 2015[40]; Hanushek and Woessmann, 2008[41]). Systems that have a smaller share of school-age children dropping out early or significantly delayed in their progression through school are considered more inclusive.

While PISA is not designed to estimate enrolment rates, it provides a range of indices that measure the coverage of the population of 15-year-olds enrolled in Grade 7 or above in each country and economy. Specifically, Coverage Index 3 in PISA captures the proportion of the national population of 15-year-olds (enrolled and not enrolled in school) represented by the PISA sample. Low values of Coverage Index 3 may be attributed to 15-year-olds who are no longer enrolled in school or who were held back in primary school. Coverage Index 3 may also be lower due to student exclusions from the PISA test and dropouts during the school year.

The proportion of 15-year-olds in each country/economy covered by the PISA sample (Coverage Index 3) ranges from 36% in Cambodia and 48% in Guatemala to 90% or more in 34 countries and economies (Table I.B1.4.1). While the PISA results are representative of the target population in all adjudicated countries/economies, they cannot be readily generalised to the entire population of 15-year-olds in countries where many young people of that age are not enrolled in lower or upper secondary school.

Basic proficiency in mathematics, reading and science

Up to this point in the report, low performance has been considered by examining each subject separately (see Chapter 3 and sections earlier in this chapter). However, students who perform poorly in one subject can and often do perform poorly in other subjects as well. Understanding the true extent of low performance requires looking at the overlap of low performance across subjects.

Furthermore, performance results presented up to this point are based on 15-year-old students covered by the PISA target population in 2022. However, in most countries/economies in PISA there is a certain number of 15-year-olds that were not covered by the PISA sample (see data on Coverage Index 3 in previous section). It is not possible to know for certain how 15-year-olds who are not represented by the PISA sample would have scored had they sat the assessment. To estimate the possible impact of the 15-year-olds not covered by the PISA sample on skills distribution, it is necessary to estimate who they are, and how they would have scored had they sat the PISA test. Household surveys often show that children from poor households, ethnic minorities or rural areas face a greater risk of not attending or completing lower secondary education (UNESCO, 2015[42]). Research has also suggested that out-of-school 15-year-olds, and students who are retained below grade 7, would have scored in the bottom part of a country's performance distribution (Spaull, 2018[43]; Spaull and Taylor, 2015[39]; Taylor and Spaull, 2015[40]). Rather than attributing an exact score to these 15-year-olds, it is possible to estimate lower and upper bounds for most results of interest, including the mean score, the median score and other percentiles, or the proportion of 15-year-olds reaching minimum levels of proficiency (Avvisati, 2017[44]; OECD, 2019[45]). Under a best-case scenario (the distribution of reading, mathematics and science skills in the population not covered by the sample is the same as that of the covered population), the estimates of mean scores and percentiles derived from PISA samples represent an upper bound on the means, percentiles and proportions of students reaching minimum proficiency amongst the entire population of 15-year-olds. A lower bound can be estimated by assuming a plausible worst-case scenario, such as that all 15-year-olds not covered by the sample would score below a certain point in the distribution. For example, if all of those 15-year-olds had scored below Level 2, then the lower bound on the proportion of 15-year-olds reaching minimum levels of proficiency would simply be this proportion in the PISA target population multiplied by Coverage Index 3.

Figure I.4.19 presents the proportion of 15-year-olds reaching minimum levels of proficiency reflecting the assumption that all 15-year-olds not covered by the PISA sample would score below Level 2 in each subject. In the figure, 15-year-olds are grouped according to whether they scored below the baseline level of proficiency in one subject only, in two subjects, or in all three of the core subjects PISA assesses (i.e. mathematics, reading and science) in addition to students not covered in the PISA sample, who are assumed to be low performers in the three subjects. The figure shows that all countries and economies that participated in PISA 2022, even those with the highest performance and equity levels, have a sizeable share of low performers.

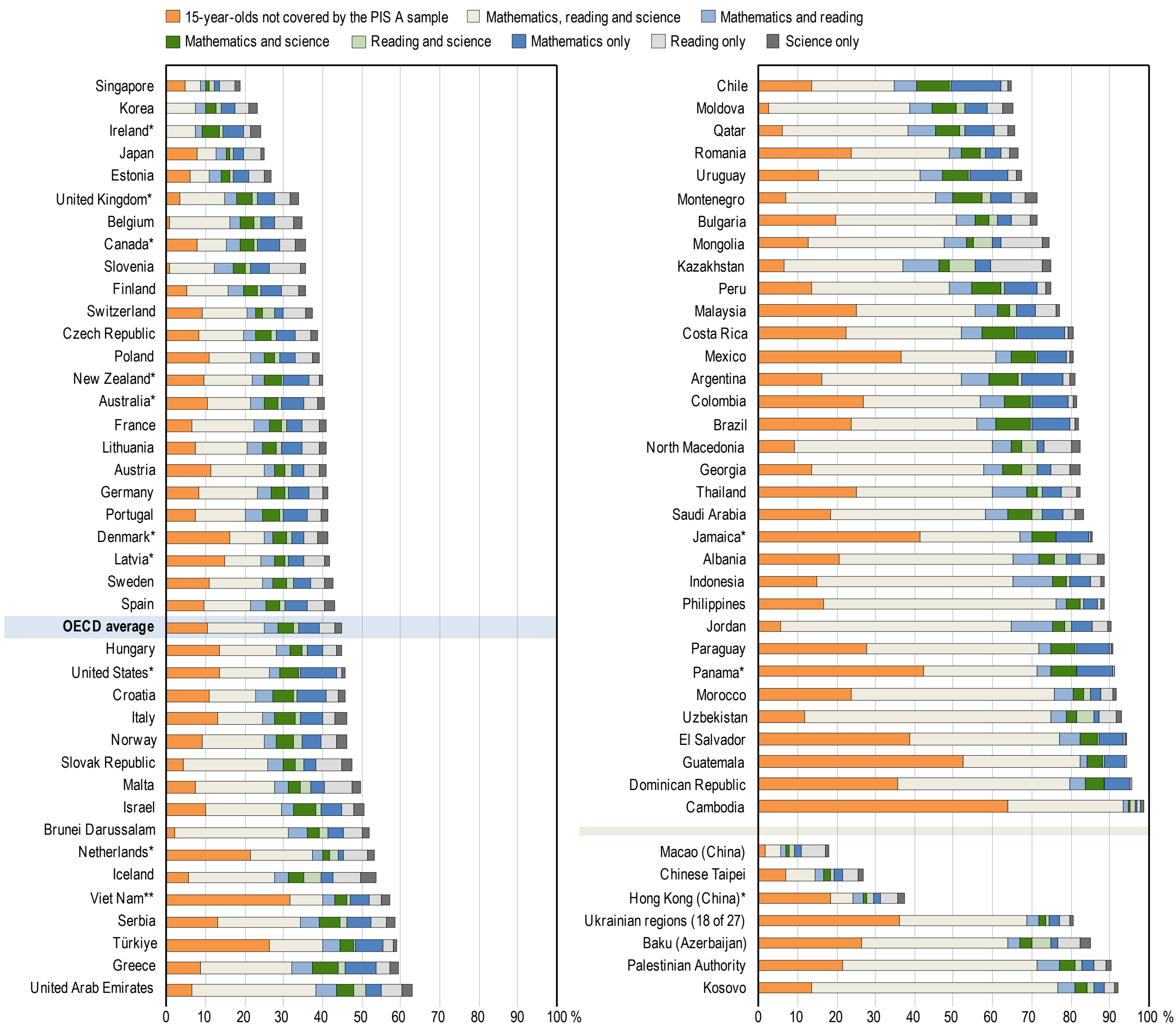
The largest category of low-performing students is the group of 15-year-olds who scored below the baseline level of proficiency in all three subjects: one in four students (25%) are low performers in mathematics, reading and science on average across OECD countries (i.e. this percentage includes 15-year-olds who are not covered by PISA, which on average across OECD countries is 11%, plus students who took the PISA test). In 18 countries and economies, more than 60% of 15-year-olds are low performers in all three subjects.

Some 5% of students across OECD countries are low performers in mathematics only; 4% are low performers in reading only; 4% are low performers in mathematics and science but not in reading; 4% are low performers in mathematics and reading but not in science; 2% of students are low performers in science only; and 1% are low performers in reading and science but not in mathematics.

The sum of all the categories of low performers included in Figure I.4.19 is the share of 15-year-olds who are low performers in at least one subject (whether it be mathematics, reading or science) and those outside the PISA target population. On average across OECD countries, 45% of 15-year-olds are low performers in at least one subject but the shares vary significantly across countries. In 38 countries and economies, more than 60% scored below baseline proficiency Level 2 in at least one subject. By contrast, in five countries/economies fewer than 25% of 15-year-olds were low performers in at least one subject.

Figure I.4.19. Overlap of low performers in mathematics, reading and science among all 15-year olds

Percentage of students who score below proficiency Level 2



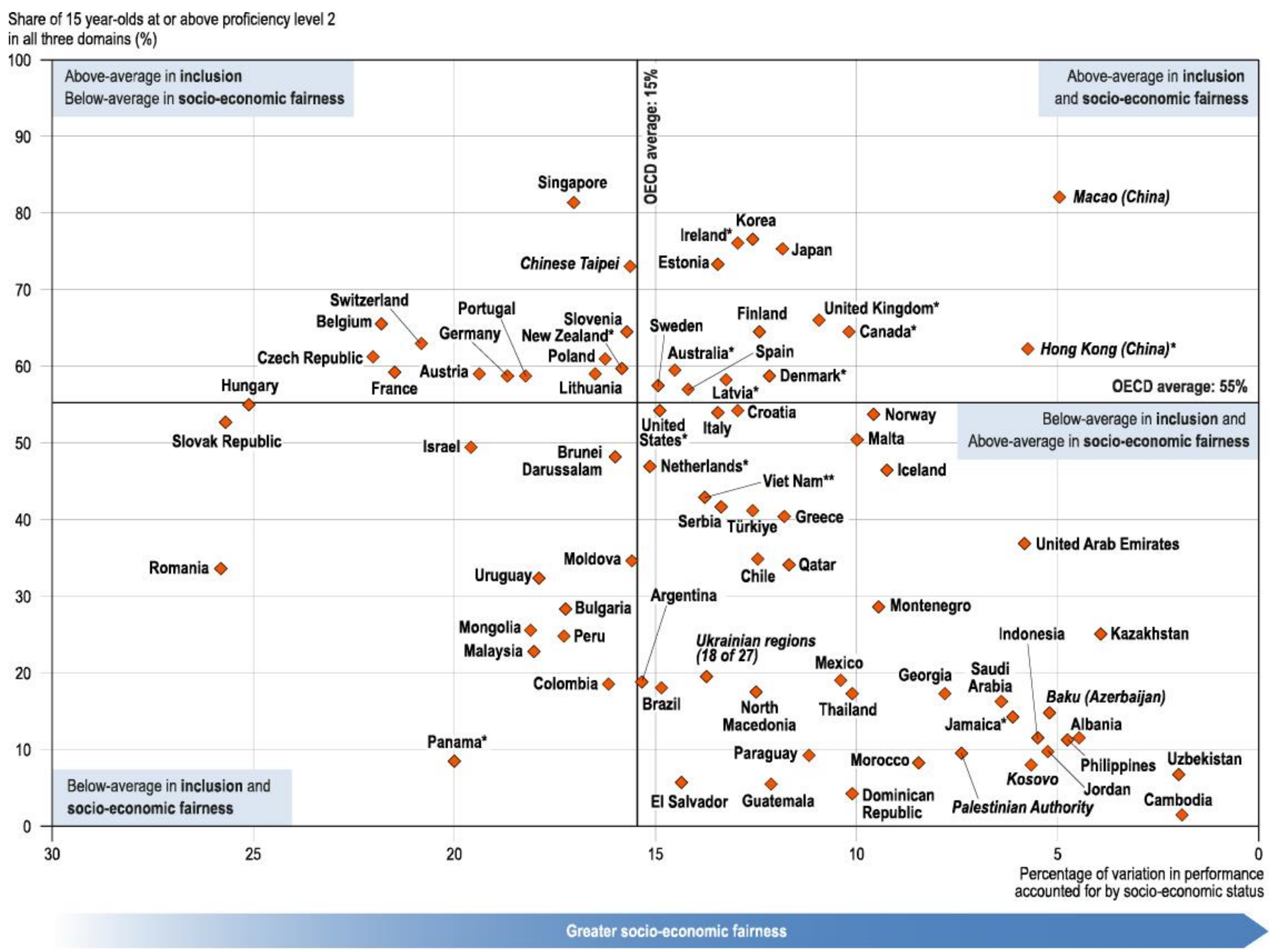
** Caution is required when comparing estimates based on PISA 2022 with other countries/economies as a strong linkage to the international PISA reading scale could not be established (see Reader's Guide and Annex A4).
Note: 15-year-olds not covered by the PISA sample are 15-year-olds who are not enrolled in school; or who are in school but in grade 6 or below, or who were excluded from the PISA sample due to student or school-level exclusions.
Countries and economies are ranked in ascending order of the total percentage of students who are low performers in at least one subject.
Source: OECD, PISA 2022 Database, Tables I.B1.4.1 and I.B1.4.45.

From fairness and inclusion to equity in education

PISA 2022 defined equity in education in terms of two components: fairness and inclusion. Only education systems that combine high levels of fairness and inclusion are considered highly equitable. Figure I.4.20 shows countries and economies according to their levels of inclusion and fairness. The level of inclusion is measured by the percentage of low performers in at least one subject among all 15-year-olds. The level of fairness is measured by the percentage of variance in mathematics performance accounted for by student socio-economic status.

In 10 out of the 27 countries/economies that had a level of inclusion above the OECD average (i.e. 55% of students who scored at or above proficiency Level 2 in mathematics, reading and science), the level of fairness by socio-economic status was significantly above the OECD average (i.e. 15% of variance in mathematics performance accounted for by student socio-economic status). Education systems in Canada*, Denmark*, Finland, Hong Kong (China)*, Ireland*, Japan, Korea, Latvia*, Macao (China) and the United Kingdom* achieved high inclusion and high fairness; thus, they can be considered highly equitable. In addition, the average score in mathematics, reading and science was higher than the OECD average in all these countries (except for Latvia* where the mean score in reading was not statistically significantly different from the OECD average).

Figure I.4.20. Strength of the socio-economic gradient and share of 15 year-olds at or above proficiency level 2 in mathematics, reading and science



Notes: Only countries and economies with available data are shown.
The socio-economic status is measured by the PISA index of economic, social and cultural status.
Source: OECD, PISA 2022 Database, Tables I.B1.4.3 and I.B1.4.45.

Table I.4.3. Equity in education in PISA 2022 figures and tables

Figure I.4.1	Student socio-economic status
Figure I.4.2	Strength of socio-economic gradient and mathematics performance
Figure I.4.3	Mean performance in mathematics, by national quarter of socio-economic status
Figure I.4.4	Low performers in mathematics, by socio-economic status
Figure I.4.5	Resilient students in mathematics
Figure I.4.6	Percentage of students that did not eat at least once a week in the past 30 days, because there was not enough money to buy food
Figure I.4.7	Gender gap in mathematics performance
Figure I.4.8	Gender gap in reading performance
Figure I.4.9	Low performers in mathematics, by gender
Figure I.4.10	Low performers in reading, by gender
Figure I.4.11	Top performers in mathematics, by gender
Figure I.4.12	Top performers in reading, by gender
Table I.4.1	The PISA policy framework
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Figure I.4.14	Mathematics performance and per capita GDP
Figure I.4.15	Mathematics performance and spending on education
Figure I.4.16	Mathematics performance and educational attainment among 35-44 year-olds
Figure I.4.17	Mathematics performance and fourth-graders' performance in TIMSS 2015
Figure I.4.18	Mean performance in mathematics, by international decile of socio-economic status
Figure I.4.19	Overlap of low performers in mathematics, reading and science among all 15-year-olds
Figure I.4.20	Strength of the socio-economic gradient and share of 15-year-olds at or above proficiency level 2 in mathematics, reading and science

StatLink https://stat.link/4q3apj

Notes

[1] When interpreting results in this chapter, keep in mind that the coverage of the population of 15-year-olds enrolled in school varies significantly across countries/economies (PISA's Coverage Index 3 [CI3] measures the proportion of the national population of 15-year-olds represented in the PISA sample). For analysis on equity, low coverage is an issue because research suggests that socio-economically disadvantaged and low-performing students are less likely to be enrolled in school by age 15 (UNESCO, 2015[42]; Spaull, 2018[43]; Taylor and Spaull, 2015[40]). This means that in countries/economies with lower coverage, the most disadvantaged 15-year-olds might not be represented in the PISA sample. This, in turn, might introduce a bias in the estimation of the students' socio-economic status and in the analysis of the relationship between socio-economic status and student performance.

[2] Across countries and economies that took part in PISA 2022, per-capita GDP and average student socio-economic status (as measured by mean value in the ESCS index) are strongly correlated (correlation coefficient = 0.74). Across OECD countries, the correlation is also strong (correlation coefficient = 0.69).

[3] The number of countries and economies that took part in PISA 2022 is 81. However, data for the PISA ESCS index is not available for Costa Rica. Therefore, only 80 countries and economies are included in this correlation, and any other analysis involving ESCS index data.

[4] In this section, performance in mathematics by socio-economic status is examined. Results on performance in reading and science are available in Tables included in Annex B1 (see Tables I.B1.4.4 and I.B1.4.5).

[5] Across all countries and economies in PISA 2022 with available data, the correlation coefficient between mean score in mathematics and the level of (un)fairness of the education system (i.e. as measured by the strength of the socio-economic gradient) is 0.36. Across OECD countries, an equivalent correlation coefficient is 0.07.

[6] The relationship between food insecurity and mean score in mathematics is not driven by countries/economies where food insecurity is extremely high. After taking out of the analysis the four countries/economies where the percentage of "students that did not eat at least once a week in the past 30 days because there was not enough money to buy food" was higher than 35% (Baku [Azerbaijan], Cambodia, Jamaica* and the Philippines), the strength of the relationship between food insecurity and mean score in mathematics across the remaining 63 countries and economies does not change much (correlation coefficient=-0.63) compared to when all 67 countries with available data are included in the analysis (correlation coefficient=-0.61).

[7] In this section, performance in mathematics and reading by gender are examined. Results on performance in science by gender are available in Annex B1, in Tables I.B1.4.19 and I.B1.4.33.

[8] The average age at time of testing among 4th grade students who participated in TIMSS 2015 was typically around 10 years old (students born in 2005). PISA 2022 assessed students who were aged between 15 years and 3 months and 16 years and 2 months at the beginning of the assessment period (students born in students born in 2006). Thus, students in TIMSS 2015 and PISA 2022 are of a similar but not identical cohort.

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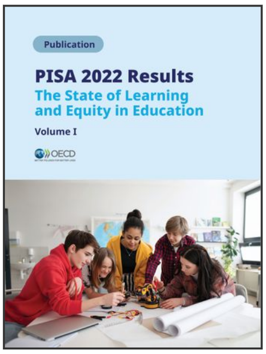

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