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Viewing the United States School System through the Prism of PISA

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This chapter compares the United States with education systems that have performed well or are rapidly improving on PISA and other international benchmarks. It provides a backdrop for the subsequent chapters, which examine the performance of United States' students in finer detail, including in relation to the Common Core Standards. The concluding chapter then draws out some lessons to be learned for the United States from both the comparative data and the countries portrayed in this volume.

Since the focus of the PISA 2012 assessment was on mathematics, this chapter examines the results for mathematics in greater detail than those for reading and science. Unless noted otherwise, references to tables and figures refer to the PISA 2012 report.

LEARNING OUTCOMES

The United States remains in the middle of the rankings

Among the 34 OECD countries, the United States performed below average in mathematics (rank 26[1]) and around the average in reading (rank 17[2]) and science (rank 21[3]) in the 2012 PISA assessment of 15-year-olds (Table 2.1). Figures 2.12, 2.13 and 2.14 at the end of this chapter show the relative standing of the United States compared with OECD and other countries.

■ Table 2.1. ■

United States' mean scores in mathematics, reading and science

	PISA 2000	PISA 2003	PISA 2006	PISA 2009	PISA 2012
	Mean score	Mean score	Mean score	Mean score	Mean score
Mathematics		483	474	487	481
Reading	504	495		500	498
Science			489	502	497

Source: OECD, 2013a.

There is, of course, significant performance variability within the United States, including between individual states. Unlike other federal nations, the United States did not measure the performance of all states individually, but students in three states – Florida, Connecticut and Massachusetts – were oversampled so as to give state-level results for these states. In mathematics, Massachusetts scored highest of the three, with 514 points (comparable with the performance of Germany), followed by Connecticut with 506 points (comparable with the performance of Austria) and then Florida with 467 points (comparable with the performance of Israel). This ordering of the three states was repeated both for reading and science performance.

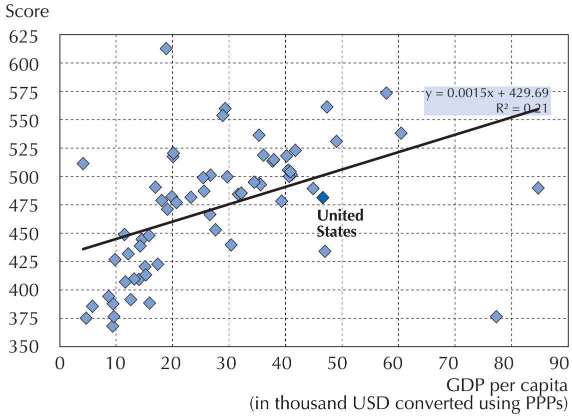
Performance varies even more between schools and social contexts. For example, despite the fact that the relationship between socio-economic background and learning outcomes is stronger in the United States than in most of the top-performing systems, around half of the students in disadvantaged schools have average or better achievement in mathematics.[4]

Based on annualized changes in performance, student performance in mathematics in the United States has shown no significant change since 2003, the first year from which mathematics trends can be measured. Similarly, there has been no significant change in reading performance since 2000 and none in science since 2006.

Average performance needs to be seen against a range of socio-economic background indicators, most of which give the United States a significant advantage compared with other industrialized countries (see Box 2.1 and OECD, 2013a: Table I.2.27).

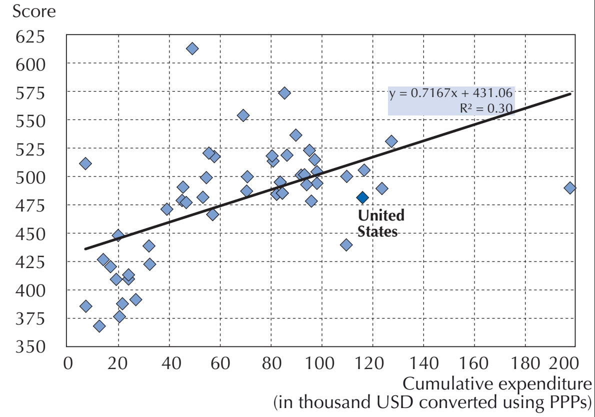
Box 2.1 **A context for interpreting the performance of countries**

■ Figure 2.1a ■
Mathematics performance and Gross Domestic Product



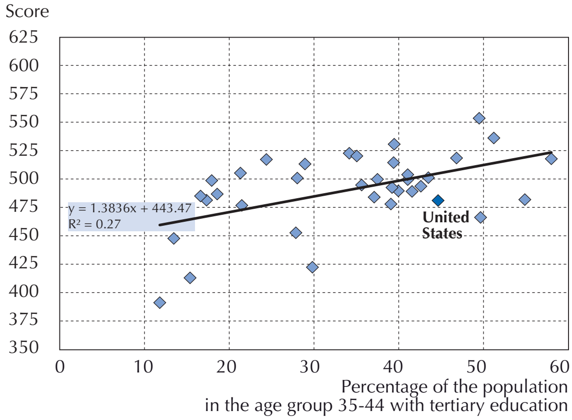
Source: OECD, PISA 2012 Database, Table I.2.27.

■ Figure 2.1b ■
Mathematics performance and spending on education



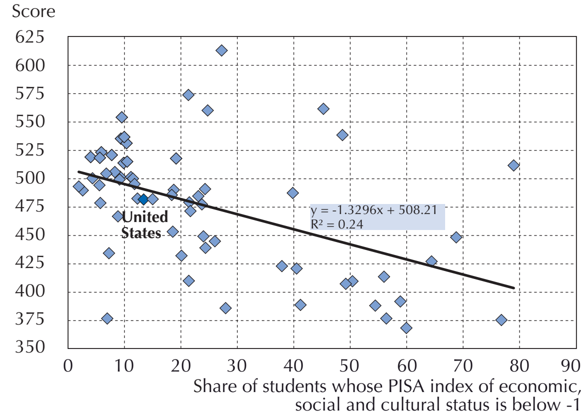
Source: OECD, PISA 2012 Database, Table I.2.27.

■ Figure 2.1c ■
Mathematics performance and parents' education



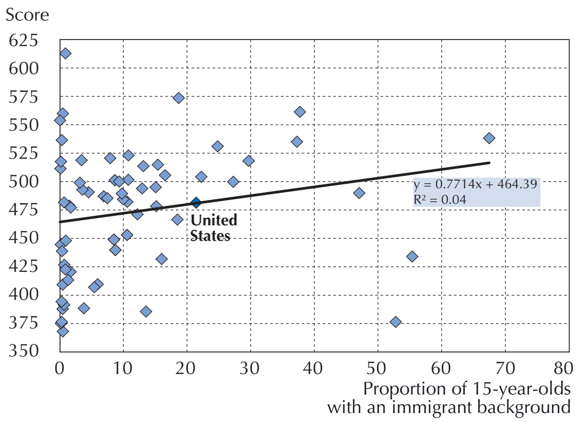
Source: OECD, PISA 2012 Database, Table I.2.27.

■ Figure 2.1d ■
Mathematics performance and share of socio-economically disadvantaged students



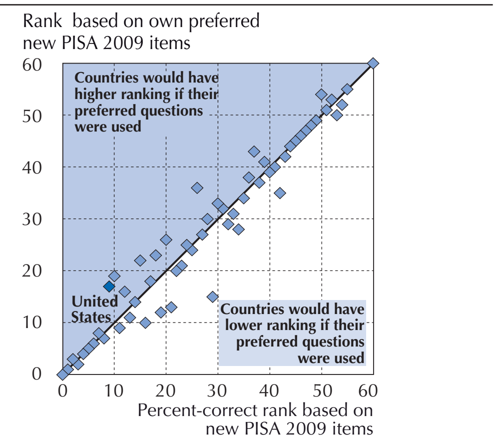
Source: OECD, PISA 2012 Database, Table I.2.27.

■ Figure 2.1e ■
Mathematics performance and proportion of students from an immigrant background



Source: OECD, PISA 2012 Database, Table I.2.27.

■ Figure 2.1f ■
Equivalence of the PISA assessment across cultures and languages



Source: OECD, PISA 2012 Database, Table I.2.28.

Comparing mathematics performance, and educational performance more generally, poses numerous challenges. When teachers give a mathematics test in a classroom, students with varying abilities, attitudes and social backgrounds are required to respond to the same set of tasks. When educators compare the performance of schools, the same test is used across schools that may differ significantly in the structure and sequencing of their curricula, in the pedagogical emphases and instructional methods applied, and in the demographic and social contexts of their student populations. Comparing performance across countries adds more layers of complexity, because students are given tests in different languages, and because the social, economic and cultural context of the countries being compared are often very different. However, even though students within a country may learn in different contexts depending on their home background and the school that they attend, their performance is measured against common standards, since, when they become adults, they will all face common challenges and have to compete for the same jobs. Similarly, in a global economy, the benchmark for success in education is no longer improvement against national standards alone, but increasingly in relation to the best-performing education systems internationally. As difficult as international comparisons are, they are important for educators, and PISA goes to considerable lengths to ensure that such comparisons are valid and fair.

This box discusses countries' mathematics performance in the context of important economic, demographic and social factors that can influence assessment results. It provides a framework for interpreting the results that are presented later in the chapter.

- ***The wealth of the United States means it can spend more on education.*** As shown in the PISA 2012 results (OECD, 2013b), family wealth influences the educational performance of children. Similarly, the relative prosperity of some countries allows them to spend more on education, while other countries find themselves constrained by a lower national income. In fact, 12% of the variation between OECD countries' mean scores can be predicted on the basis of per capita gross domestic product (GDP). The United States, which ranks 3rd after Luxembourg and Switzerland in terms of per capita GDP, has a substantial economic advantage over many other OECD countries because of the amount of money it has available to spend on education (Figure 2.1a and OECD 2013a, Table I.1.27).
- ***Only Austria, Luxembourg, Norway and Switzerland spend more per student.*** 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. However, a comparison of countries' actual spending per student, on average, from the age of 6 up to the age of 15 also puts the United States at an advantage, since only Austria, Luxembourg, Norway and Switzerland spend more, on average, on school education per student. Across OECD countries, expenditure per student explains 17% of the variation in mean PISA performance between countries. Deviations from the trend line, however, suggest that moderate spending per student cannot automatically be equated with poor performance by education systems. For example, the Slovak Republic, which spends around USD 53 000 per student, performs at the same level as the United States, which spends over USD 115 000 per student.[5] Similarly, Korea, the highest-performing OECD country in mathematics, spends well below the average on each student (Figure 2,1b and OECD 2013a, Table I.2.27).
- ***Money needs to be directed where it can make the most difference.*** It is not just the volume of resources that matters but also how countries invest these, and how well they succeed in directing the money where it can make the most difference. In some countries, students in socio-economically disadvantaged schools have to cope with less favourable student-teacher ratios and have less well-qualified teachers than in socio-economically advantaged schools. In the United States, however, there is little difference in the student-teacher ratios between advantaged and disadvantaged schools. Similarly, there is no difference between advantaged and disadvantaged schools in terms of the proportion of teachers who have a university-level qualification. The United States spends a far lower proportion than the average OECD country on the salaries of high-school teachers. At the same time, high-school teachers in the United States teach far more hours, which reduces costs, but smaller class sizes are driving costs upward (OECD, 2013e: Table B7.4a). By contrast, Japan and Korea pay their teachers comparatively well and provide them with ample time for work other than teaching, which drives costs upward, while paying for this with comparatively large class sizes. Finland puts emphasis on non-salary aspects of the working conditions of high-school teachers and also pays for the costs with comparatively large class size. Finally, the OECD indicators also show that the United States spends 11.4% of its resources for schools on capital outlays, a figure that is notably higher than the OECD average of 8.7% (OECD 2013e, Table B6.2b).

- ***Parents in the United States are better educated than those in most other countries.*** Given the close relationship between a student's performance and his or her parents' level of education, it is also important to bear in mind the educational attainment of adult populations when comparing the performance of OECD countries. Countries with more highly educated adults are at an advantage over countries where parents have less education. Figure 1.2c shows 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. Parents' level of education explains 27% of the variation in mean performance between countries and economies (23% of the variation among OECD countries). The United States ranks sixth highest among OECD countries on this measure.
- ***The share of students from disadvantaged backgrounds in the United States is about average.*** Differences in the socio-economic background of student populations pose another major challenge for teachers and education systems. As Volume II of the 2012 PISA results have shown (OECD, 2013b), teachers instructing socio-economically disadvantaged children are likely to face greater challenges than those teaching students from more advantaged backgrounds. Similarly, countries with larger proportions of disadvantaged children face greater challenges than countries with smaller proportions of these students. Figure 1.2d shows the proportion of students at the lower end of an international scale of the economic, social and cultural status of students, which is described in detail in Volume II, and how this relates to mathematics performance. The relationship explains 24% of the performance variation among countries (46% of the variation among OECD countries). A comparison of the socio-economic background of the most disadvantaged quarter of students puts the United States around the OECD average while the socio-economic background of the student population as a whole ranks clearly above the OECD average.[6] In other words, while the socio-economic context of students in the United States overall is above that of a typical OECD country, the proportion of students from disadvantaged backgrounds is similar to that of OECD countries in general. The greater socio-economic variability in the United States thus does not result from a disproportionate share of students from poor families, but rather from an above-average share of students from socio-economically advantaged backgrounds.
- ***Among OECD countries, the United States has the 6th largest proportion of students with an immigrant background.*** Integrating students with an immigrant background is part of the socio-economic challenge. The PISA performance levels of students who immigrated to the country in which they were assessed can only be partially attributed to the education system of their host country. The United States has the 6th highest share of students with an immigrant background among OECD countries, at 21.4%. However, the share of students with an immigrant background explains just 4% of the performance variation between countries. Despite having large proportions of immigrant students, some countries, like Canada, perform above the OECD average. Eight OECD countries have between 15% and 30% of students with an immigrant background, including the United States. Of these, four show a smaller PISA performance gap for immigrants than the United States, while three show a larger performance gap (Figure 1.2e and OECD 2013b, Table II.3.4a).

The data in Box 2.1 show that countries vary in their demographic, social and economic contexts. These differences need to be taken into account when interpreting differences in student performance. At the same time, the future economic and social prospects of both individuals and countries depend on the results they actually achieve, not on the performance they might have achieved under different social and economic conditions. That is why the results actually achieved by students, schools and countries are the focus of the subsequent analysis in this chapter.

Even after accounting for the demographic, economic and social contexts of education systems, the question remains: to what extent is an international test meaningful when differences in languages and cultures lead to very different ways in which subjects such as language, mathematics or science are taught and learned across countries? It is inevitable that not all tasks on the PISA assessments are equally appropriate in different cultural contexts and equally relevant in different curricular and instructional contexts. To gauge this, PISA asked every country to identify those tasks from the PISA tests that it considered most appropriate for an international test. Countries were advised to give an on-balance rating for each task with regard to its relevance to "preparedness for life", authenticity and interest for 15-year-olds. Tasks given a high rating by each country are referred to as that country's most preferred questions for PISA. PISA then scored every country on its own most preferred questions and compared the resulting performance with the performance on the entire set of PISA tasks. For the United States, its relative standing remains the same, irrespective of whether all PISA items or the items "preferred" by the United States are used as a basis for comparisons.

■ Figure 2.2 ■

Summary descriptions for the six levels of proficiency in mathematics

Level	Lower score limit	Percentage of students able to perform tasks at each level or above (OECD average)	What students can typically do
6	669	3.3%	At Level 6, students can conceptualize, generalize and utilize information based on their investigations and modelling of complex problem situations, and can use their knowledge in relatively non-standard contexts. They can link different information sources and representations and flexibly translate among them. Students at this level are capable of advanced mathematical thinking and reasoning. These students can apply this insight and understanding, along with a mastery of symbolic and formal mathematical operations and relationships, to develop new approaches and strategies for attacking novel situations. Students at this level can reflect on their actions, and can formulate and precisely communicate their actions and reflections regarding their findings, interpretations, arguments, and the appropriateness of these to the original situation.
5	544	12.6%	At Level 5, students can develop and work with models for complex situations, identifying constraints and specifying assumptions. They can select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. Students at this level can work strategically using broad, well-developed thinking and reasoning skills, appropriate linked representations, symbolic and formal characterisations, and insight pertaining to these situations. They begin to reflect on their work and can formulate and communicate their interpretations and reasoning.
4	545	30.8%	At Level 4, students can work effectively with explicit models for complex concrete situations that may involve constraints or call for making assumptions. They can select and integrate different representations, including symbolic, linking them directly to aspects of real-world situations. Students at this level can utilize their limited range of skills and can reason with some insight, in straightforward contexts. They can construct and communicate explanations and arguments based on their interpretations, arguments, and actions.
3	482	54.5%	At Level 3, students can execute clearly described procedures, including those that require sequential decisions. Their interpretations are sufficiently sound to be a base for building a simple model or for selecting and applying simple problem-solving strategies. Students at this level can interpret and use representations based on different information sources and reason directly from them. They typically show some ability to handle percentages, fractions and decimal numbers, and to work with proportional relationships. Their solutions reflect that they have engaged in basic interpretation and reasoning.
2	420	77.0%	At Level 2, students can interpret and recognize situations in contexts that require no more than direct inference. They can extract relevant information from a single source and make use of a single representational mode. Students at this level can employ basic algorithms, formulae, procedures, or conventions to solve problems involving whole numbers. They are capable of making literal interpretations of the results.
1	358	92.0%	At Level 1, students can answer questions involving familiar contexts where all relevant information is present and the questions are clearly defined. They are able to identify information and to carry out routine procedures according to direct instructions in explicit situations. They can perform actions that are almost always obvious and follow immediately from the given stimuli.

Relative shares of students "at risk"

Just over one-quarter (26%) of 15-year-olds in the United States do not reach the PISA baseline Level 2 of mathematics proficiency. This percentage is higher that the OECD average of 23% and has remained unchanged since 2003. Excluding students with an immigrant background reduces the percentage of poorly performing students slightly to 16%. By contrast, in Canada, Hong Kong-China, Korea, Shanghai-China and Singapore, the proportion of poor performers is around 10% or less (OECD 2013a, Figure I.2.22).

Level 2 on the PISA mathematics scale can be considered a baseline level of proficiency at which students begin to demonstrate the skills that will enable them to participate effectively and productively in life. Students proficient at Level 2 can interpret and recognize situations in contexts that require no more than direct inference. They can extract relevant

information from a single source and make use of a single representational mode. Students at this level can employ basic algorithms, formulae, procedures or conventions to solve problems involving whole numbers. They are capable of making literal interpretations of the results.

Results from longitudinal studies in Australia, Canada, Denmark and Switzerland show that students who do not reach Level 2 often face severe disadvantages in their transition into higher education and the labour force in subsequent years. The proportion of students who perform below this baseline proficiency level thus indicates how well countries are performing at providing their populations with a minimum level of competence (OECD, 2012).

For example, the follow-up of students who were assessed by PISA in 2000 as part of the Canadian Youth in Transition Survey shows that students scoring below Level 2 face a disproportionately higher risk of poor post-secondary participation or low labour-market outcomes at age 19, and even more so at age 21, the latest age for which data are currently available. The odds of Canadian students who had reached PISA Level 5 in reading at age 15 achieving a successful transition to post-secondary education by age 21 were 20 times higher than for those who had not achieved the baseline Level 2, even after adjustments for socio-economic differences were made (OECD, 2010a).[7] Similarly, over 60% of the Canadian students who performed below Level 2 in 2000 had not gone on to any post-school education by the age of 21; by contrast, more than half of the students (55%) who had reached Level 2 as their highest level were at college or university.

In reading, the proportion of students in the United States below Level 2 on the PISA reading scale is 16.6% against an OECD average of 18.0%, representing a slight improvement over 2000 when the figure was 17.9% (OECD, 2013a: Table I.4.1b). Students proficient at Level 2 in reading are capable of very basic tasks such as locating information that meets several conditions, making comparisons or contrasts around a single feature, working out what a well-defined part of a text means even when the information is not prominent, and making connections between the text and personal experience.

In science, 18.1% of students in the United States did not reach Level 2 on the PISA science scale, around the OECD average. This shows an improvement over 2006, when the proportion was 24.4% (OECD, 2013a: Table I.5.1b). To reach Level 2 requires competencies such as identifying key features of a scientific investigation, recalling single scientific concepts and information relating to a situation, and using results of a scientific experiment represented in a data table in support of a personal decision. In contrast, students who do not reach Level 2 in science often confuse key features of an investigation, apply incorrect scientific information and mix personal beliefs with scientific facts in support of a decision.

Relative shares of top-performing students

At the other end of the performance scale, the United States has a below-average share of top performers in mathematics. It does slightly better in reading and science where the proportion of top performers is around the OECD average (OECD 2013a, Figures I.2.23, I.4.11 and I.5.11).

Only 2% of students in the United States reach the highest level (Level 6) of performance in mathematics, compared with an OECD average of 3%, and figures of up to 31% in Shanghai-China (OECD 2013a, Table I.2.1a).

Students proficient at Level 6 of the PISA mathematics assessment are able to successfully complete the most difficult PISA items. At Level 6, students can conceptualize, generalize and use information based on their investigations and modelling of complex problem situations, and can use their knowledge in relatively non-standard contexts. They can link different information sources and representations and move flexibly among them. Students at this level are capable of advanced mathematical thinking and reasoning. They can apply this insight and understanding, along with a mastery of symbolic and formal mathematical operations and relationships, to develop new approaches and strategies for addressing novel situations. Students at this level can reflect on their actions, and can formulate and precisely communicate their actions and reflections regarding their findings, interpretations and arguments, and can explain why they were applied to the original situation.

At the next highest level, Level 5 on the PISA mathematics scale, students can develop and work with models for complex situations, identifying constraints and specifying assumptions. They can select, compare and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. Students at this level can work strategically using broad, well-developed thinking and reasoning skills, appropriate linked representations, symbolic and formal characterizations, and insights pertaining to these situations. They begin to reflect on their work and can formulate and communicate their interpretations and reasoning.

Some 8.8% of students in the United States reach the PISA mathematics Level 5, compared with 12.6% on average across OECD countries. In Shanghai-China, over half of the students reach Level 5, while in Hong Kong-China, Korea, Singapore and Chinese Taipei, 30% or more do, and in Japan, Liechtenstein, Macao-China and Switzerland over 20% do.

In reading, students proficient at the top level on the PISA reading scale, Level 6, are capable of conducting fine-grained analysis of texts, which requires detailed comprehension of both explicit information and unstated implications. They are capable of reflecting on and evaluating what they read at a more general level. They can overcome preconceptions in the face of new information, even when that information is contrary to expectations. They are capable of recognizing what is provided in a text, both conspicuously and more subtly, while at the same time being able to apply a critical perspective to it, drawing on sophisticated understandings from beyond the text. This combination of a capacity to absorb the new and to evaluate it is greatly valued in knowledge economies, which depend on innovation and nuanced decision making that draws on all the available evidence. At 1.0%, the United States has an average share of the highest-performing readers, when compared with the share among OECD countries. However, in Singapore the share is 5% and in Japan, New Zealand and Shanghai-China it is 3% or more.

At the next highest level, Level 5 on the PISA reading literacy scale, students can still handle texts that are unfamiliar in either form or content. They can find information in such texts, demonstrate detailed understanding and infer which information is relevant to the task. Using such texts, they are also able to evaluate critically and build hypotheses, draw on specialized knowledge and accommodate concepts that may be contrary to expectations. In the United States, 8% of students perform at Level 5 or above, an average share. However, in Shanghai-China (25.1%), Singapore (21.2%), Japan (18.5%) and Hong-Kong China (16.8%) the corresponding percentages are higher.

Students proficient at Level 6 in science can consistently identify, explain and apply scientific knowledge and knowledge about science in a variety of complex life situations. They can link different information sources and explanations and use evidence from those sources to justify decisions. They clearly and consistently demonstrate advanced scientific thinking and reasoning, and they use their scientific understanding to solve unfamiliar scientific and technological situations. Students at this level can use scientific knowledge and develop arguments in support of recommendations and decisions that center on personal, social or global situations. In the United States, 1% of students reaches Level 6 in science, which corresponds to the OECD average. In Singapore, the percentage is 5.8%, in Shanghai-China 4.2%, in Japan 3.4% and in Finland 3.2%.

Students proficient at the PISA science Level 5 can identify the scientific components of many complex life situations, apply both scientific concepts and knowledge about science to these situations, and can compare, select and evaluate appropriate scientific evidence for responding to life situations. Students at this level can use well-developed inquiry abilities, link knowledge appropriately and bring critical insights to situations. They can construct explanations based on evidence and arguments that emerge from their critical analysis. In the United States, 9% of students reach this level, which again corresponds to the OECD average. In Shanghai-China, 27.2% of students do, while in Singapore the percentage is 22.7%, in Japan 18.2%, in Finland 17.1% and in Hong Kong-China 16.7%.

EQUITY IN THE DISTRIBUTION OF LEARNING OPPORTUNITIES

PISA explores equity in education from three perspectives. First, it examines differences in the distribution of learning outcomes of students and schools. Second, it studies the extent to which students and schools of different socio-economic backgrounds have access to similar educational resources, both in terms of quantity and quality. Third, it looks at the impact of students' family background and school location on learning outcomes. The first perspective was discussed in the previous section; the last two are discussed below.

Learning opportunities

Previous research has shown a relationship between students' exposure to subject content in school, what is known as "opportunity to learn", and student performance (see OECD,2013a references). Building on previous measures of opportunity to learn, the PISA 2012 assessment included questions to students on the mathematics theories, concepts and content to which they have been exposed in school, and the amount of class time they spent studying this content.

The results show that students in the high-performing East Asian countries and economies – Shanghai-China, Singapore, Hong Kong-China, Chinese Taipei, Korea, Macao-China and Japan – are more frequently exposed to formal mathematics than students in the remaining PISA-participating countries and economies on average. Students in the United States report relatively high exposure to both formal mathematics - close to the level of the East Asian countries and economies, in fact – and also relatively high exposure to applied mathematics (OECD 2013a, Figure I.3.17).

The results also show that exposure to more advanced mathematics content, such as algebra and geometry, appears to be related to high performance on the PISA mathematics assessment, even if the causal nature of this relationship cannot be established. At the same time, strong mathematics performance in PISA is not only related to opportunities to learn formal mathematics, such as solving a quadratic equation, using complex numbers, or calculating the volume of a box, but also to opportunities to learn applied mathematics (using mathematics in a real-world context).

Equity in access to resources

A first potential source of inequities in learning opportunities lies in the distribution of resources across students and schools. In a school system characterized by an equitable distribution of educational resources, the quality or quantity of school resources would not be related to a school's average socio-economic background, as all schools would enjoy similar resources. A positive relationship between the socio-economic background of students and schools and the quantity or quality of resources signals that more advantaged schools enjoy more or better resources. A negative relationship implies that more or better resources are devoted to disadvantaged schools. No relationship implies that resources are distributed similarly among schools, whatever the socio-economic background of the students.

Examination of the results from PISA 2012 shows that for students attending disadvantaged schools, quantity of resources does not necessarily translate into quality of resources. In general across countries, more disadvantaged students attend schools with lower student-staff ratios, but more advantaged students attend schools that have a higher proportion of full-time teachers with a university degree. In the United States, however, there is no significant difference between advantaged and disadvantaged schools in terms of student-teacher ratios or the proportion of mathematics teachers qualified to university level.

In around half of OECD countries, the student-teacher ratio is more favourable in disadvantaged schools compared with advantaged schools – in other words, disadvantaged schools tend to have more teachers per student. This is the case in Belgium, Canada, Denmark, Estonia, Finland, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain and Sweden. This suggests that these countries use the student-teacher ratio to moderate disadvantage. Among OECD countries, only Turkey has a significantly favourable ratio of teachers to students in advantaged schools.

In just under half of OECD countries, however, more advantaged students enjoy a higher proportion of teachers with university degrees. For example, in the Netherlands the proportion of qualified teachers in socio-economically advantaged schools is more than 40% higher than the proportion of qualified teachers in disadvantaged schools (31% versus 14%). All of this suggests that ensuring an equitable distribution of resources is still a major challenge for many countries, if not in terms of the quantity of resources, then in terms of their quality.

■ Figure 2.3 ■

Summary of PISA measures of equity in educational resources

Disadvantaged schools are more likely to have more or better resources; correlation is stronger than 0.25
Advantaged schools are more likely to have more or better resources; correlation is stronger than 0.25

		Simple correlation between the school mean socio-economic profile and:						
		Student-teacher ratio[1]	Composition and qualifications of mathematics teaching staff (proportion of teachers with university-level qualifications)	Student-related factors affecting school climate	Proportion of students who leave school without a certificate	Parental pressure to achieve	Attendance at after-school lessons	Hours spent on homework or other study set by teachers
	OECD average	0.16	0.14	0.30	-0.28	0.31	0.10	0.18
OECD	Australia	**-0.05**	**0.02**	**0.52**	**-0.31**	0.36	**0.14**	0.25
	Austria	**-0.11**	**0.60**	0.23	-0.22	0.25	0.12	**0.23**
	Belgium	**0.59**	**0.61**	**0.56**	**-0.36**	0.30	**0.17**	0.31
	Canada	0.20	**0.02**	0.36	-0.31	**0.41**	0.10	**0.18**
	Chile	**-0.03**	0.19	**0.45**	**-0.34**	**0.44**	0.08	0.16
	Czech Republic	0.05	**0.28**	0.31	-0.18	0.28	**0.02**	0.14
	Denmark	0.20	0.09	0.35	-0.30	0.35	**0.00**	0.05
	Estonia	**0.45**	c	**0.09**	**-0.12**	**0.13**	**0.02**	**0.04**
	Finland	**0.36**	0.01	**0.01**	**0.02**	**0.14**	**0.05**	**0.05**
	France	w	w	w	w	w	0.13	**0.29**
	Germany	0.19	m	0.29	-0.18	**0.13**	0.08	**0.14**
	Greece	0.18	0.19	**0.14**	**-0.37**	0.35	**0.21**	0.20
	Hungary	**-0.04**	0.16	**0.47**	**-0.43**	**0.49**	**0.20**	0.32
	Iceland	**0.42**	**0.18**	**-0.01**	**-0.07**	**0.24**	**0.05**	**0.11**
	Ireland	**0.32**	-0.08	**0.42**	-0.33	**0.56**	0.10	**0.15**
	Israel	**-0.03**	0.21	**0.14**	-0.20	0.37	**-0.06**	0.07
	Italy	**0.40**	**0.30**	**0.41**	**-0.35**	0.30	**0.24**	**0.38**
	Japan	**0.30**	0.18	0.34	**-0.39**	**0.44**	**0.31**	**0.33**
	Korea	0.27	**0.02**	0.25	-0.24	**0.42**	**0.36**	**0.28**
	Luxembourg	0.17	**0.46**	**0.47**	**-0.38**	**-0.06**	**0.06**	**0.16**
	Mexico	**0.02**	**0.01**	**0.12**	**-0.02**	**0.10**	0.09	0.16
	Netherlands	**0.43**	**0.51**	0.21	-0.34	0.39	0.12	0.22
	New Zealand	0.15	0.21	**0.53**	**-0.80**	**0.44**	0.14	0.24
	Norway	0.27	c	0.28	c	**0.47**	0.09	**0.12**
	Poland	0.07	**-0.07**	**0.04**	**-0.05**	**0.07**	**0.01**	**0.03**
	Portugal	**0.41**	**-0.15**	0.17	**0.08**	0.38	0.12	**0.17**
	Slovak Republic	0.04	**-0.15**	0.25	-0.28	0.30	**-0.01**	0.16
	Slovenia	**0.25**	**0.43**	0.27	-0.23	0.27	**0.04**	0.16
	Spain	0.17	**-0.04**	**0.45**	-0.31	0.27	**0.04**	0.08
	Sweden	0.26	0.12	**0.43**	**-0.49**	0.40	0.11	**0.17**
	Switzerland	**-0.07**	0.18	**0.08**	c	**-0.10**	0.06	0.12
	Turkey	**-0.37**	0.04	0.31	-0.19	0.21	**0.05**	**0.04**
	United Kingdom	**-0.18**	**0.00**	0.35	-0.29	**0.48**	0.16	**0.31**
	United States	**0.02**	-0.02	**0.42**	-0.31	**0.47**	0.14	**0.25**
Partners	Albania	m	m	m	m	m	m	m
	Argentina	**0.05**	0.17	0.33	-0.24	0.15	**0.04**	0.10
	Brazil	**-0.21**	**-0.01**	**0.38**	-0.21	0.31	**0.05**	**0.13**
	Bulgaria	**-0.02**	c	0.23	**-0.39**	**0.40**	**0.17**	**0.33**
	Chinese Taipei	**-0.01**	0.02	0.36	-0.20	0.29	**0.29**	**0.36**
	Colombia	**-0.07**	-0.04	0.25	**-0.06**	**0.07**	0.12	**0.18**
	Costa Rica	0.18	0.15	**0.43**	**-0.41**	0.22	0.13	0.22
	Croatia	0.22	**0.42**	0.20	-0.22	0.19	0.10	0.24
	Hong Kong-China	0.04	0.04	0.21	**0.02**	**-0.07**	**0.20**	**0.14**
	Indonesia	**-0.11**	0.20	0.17	-0.19	**-0.06**	**0.14**	0.16
	Jordan	**-0.07**	**-0.01**	**0.06**	-0.18	0.19	**-0.03**	0.04
	Kazakhstan	0.22	0.21	**-0.04**	**-0.04**	0.20	0.08	**0.13**
	Latvia	**0.37**	0.16	**0.01**	-0.14	**0.13**	0.11	0.17
	Liechtenstein	**0.50**	**0.46**	**0.45**	c	**-0.56**	0.01	0.12
	Lithuania	0.05	0.05	0.24	-0.17	**0.15**	**0.04**	0.16
	Macao-China	**-0.05**	**-0.09**	**0.26**	-0.23	**0.16**	**0.15**	0.16
	Malaysia	0.08	**-0.10**	**0.41**	-0.23	0.30	0.11	0.18
	Montenegro	**0.40**	**0.27**	**0.20**	-0.25	**-0.07**	**0.05**	0.16
	Peru	0.20	-0.05	0.29	-0.14	0.18	0.08	0.13
	Qatar	**0.07**	**-0.09**	**-0.02**	**-0.06**	**0.19**	**-0.03**	**0.13**
	Romania	**-0.19**	**0.24**	0.27	-0.24	**0.06**	0.16	**0.25**
	Russian Federation	**0.35**	**0.27**	0.21	**-0.07**	0.26	0.06	**0.09**
	Serbia	0.29	0.07	0.24	-0.21	0.31	**0.03**	**0.10**
	Shanghai-China	**-0.26**	0.26	0.17	-0.35	0.19	**0.24**	**0.35**
	Singapore	0.11	**0.36**	**0.47**	-0.17	**0.38**	0.13	**0.18**
	Thailand	0.11	**0.03**	**0.12**	-0.28	0.30	**0.22**	0.24
	Tunisia	**0.05**	0.03	**-0.08**	-0.19	0.23	**0.03**	**0.07**
	United Arab Emirates	**-0.05**	**-0.05**	**0.11**	-0.22	0.26	**-0.03**	**0.11**
	Uruguay	**-0.08**	0.23	**0.54**	-0.35	0.25	0.09	**0.10**
	Viet Nam	0.12	0.10	0.20	-0.26	0.24	**0.21**	**0.20**

Note: The data are indicated in bold if within-country correlation is significantly different from the OECD average.
1. Negative correlations indicate more favourable characteristics for advantaged students.
Source: OECD, PISA 2012 Database, Table II.4.6.

Moderating the impact of socio-economic background on learning outcomes

Students who did not surpass the most basic PISA performance level were not a random group. The results show that socio-economic disadvantage has a strong impact on student performance in the United States: 15% of the variation in student performance in the United States is explained by students' socio-economic background, similar to the OECD average. This contrasts with less than 10% in a number of countries and economies, including Finland, Hong Kong-China, Japan and Norway. In other words, in the United States, two students from different socio-economic backgrounds vary much more in their learning outcomes than is normally the case in these other countries. Among OECD countries, the strongest impact of socio-economic background on mathematics performance is found in Chile, France, Hungary and the Slovak Republic where background explains more than 20% of the variation. It is important to emphasize that these countries, including the United States, do not necessarily have a more disadvantaged socio-economic student intake than other countries but that socio-economic differences among students have a particularly strong impact on student learning outcomes.

The comparatively close relationship between the learning outcomes of students in the United States and socio-economic background is not simply explained by a more socio-economically heterogeneous student population or society but, as noted before, mainly because socio-economic disadvantage translates more directly into poor educational performance in the United States than is the case in many other countries.

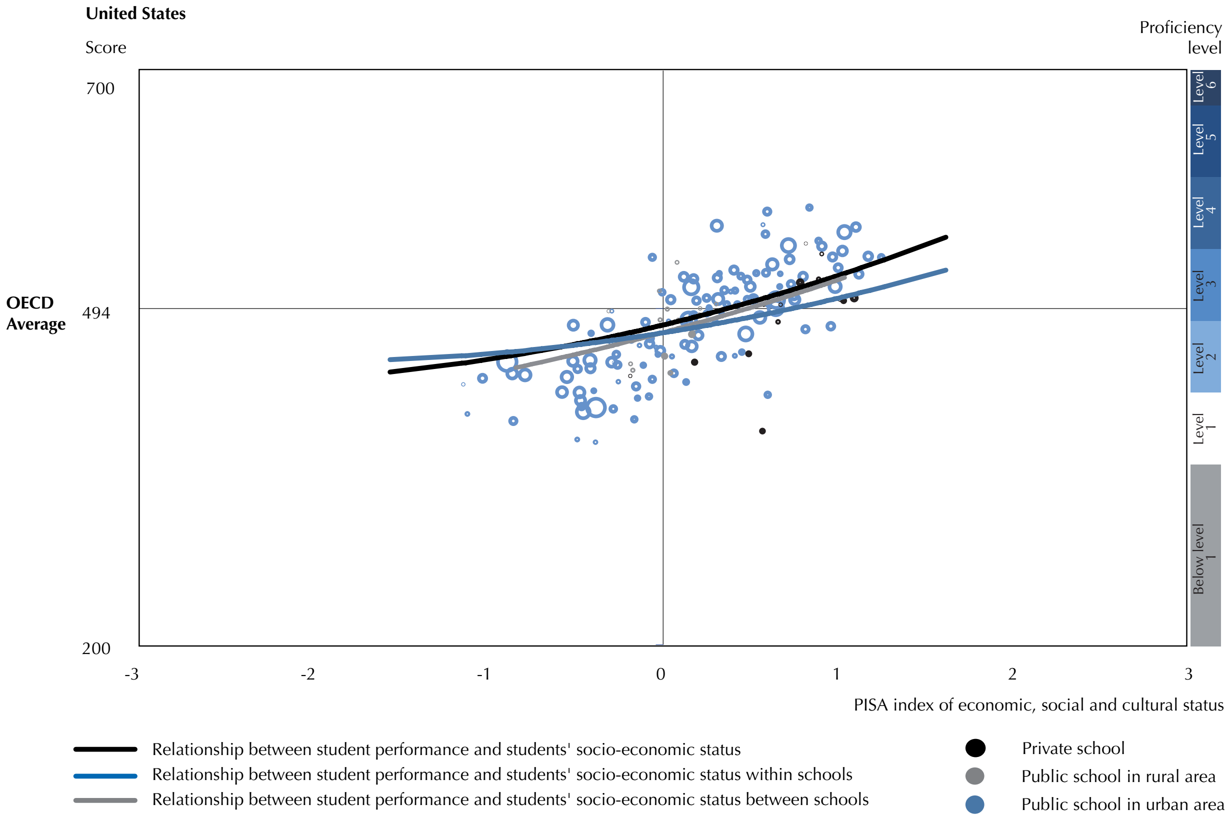
If social inequities in societies were always closely linked to the impact of social disadvantage on learning outcomes, the role of public policy in improving equity in the distribution of learning opportunities would be limited, at least in the short term. However, there is almost no relationship between income inequalities in countries and the impact of socio-economic background on learning outcomes. Some countries succeed, even under difficult conditions, to moderate the impact of socio-economic background on educational success.

The OECD Adult Skills Survey (OECD, 2013f) shows that higher levels of inequality in literacy and numeracy skills are associated with greater inequality in the distribution of income, whatever the causal nature of this relationship. If large proportions of adults have low reading and numeracy skills, the introduction and wider diffusion of productivity-improving technologies and work organization practices can be hampered and that, in turn, will stall improvements in living standards. In other words, today's education is tomorrow's economy.

Even in the United States, the relationship between socio-economic background and learning outcomes is far from deterministic (see Figure 2.4). As noted before, around half of the students in disadvantaged schools have average or better achievement in mathematics.

■ Figure 2.4 ■

Relationship between school performance and schools' socio-economic profile in the United States



It is useful to examine in greater detail four of the aspects of socio-economic background and their relationship to student performance.

- ***Community size***: On average across OECD countries, students in large cities (students attending schools located in cities with over 1 million inhabitants) outperform those in smaller town schools and in rural schools even after taking account of students' socio-economic differences. In the United States, however, these differences are not significant even before adjusting for socio-economic differences among the students. This suggests that the performance challenges for the United States therefore do not just relate to poor students in poor neighbourhoods, but to many students in many neighbourhoods.
- ***Family composition***: While results from PISA show that single-parent families are more prevalent in the United States than on average across OECD countries (20% of 15-year-olds in the United States come from a single-parent family compared with an average of 13%), they also show that 15-year-olds in the United States from single-parent families face a much higher risk of low performance than is the case across OECD countries on average (OECD 2013b, Table II.3.1).
- ***Immigrant students***: Some 22% of 15-year-old students in United States schools have an immigrant background, notably higher than the OECD average of 11% and an increase of 7 percentage points compared with 2003. Immigrant students also tend to be concentrated in certain schools within the system. In the United States, 34% of 15-year-old students are in schools that have more than a quarter of students with an immigrant background. Among OECD countries, only Australia, Canada, Luxembourg, New Zealand and Switzerland show a higher concentration of students with an immigrant background (the OECD average is 15%) (OECD 2013b, Table II.3.9). What PISA data also show is that students in the United States with an immigrant background tend to attend schools with a socio-economically more disadvantaged profile. In fact, in the United States, 40% of students in disadvantaged schools are from immigrant backgrounds, whereas they account for 13% of the student population in advantaged schools (OECD 2013b, Table II.4.5).

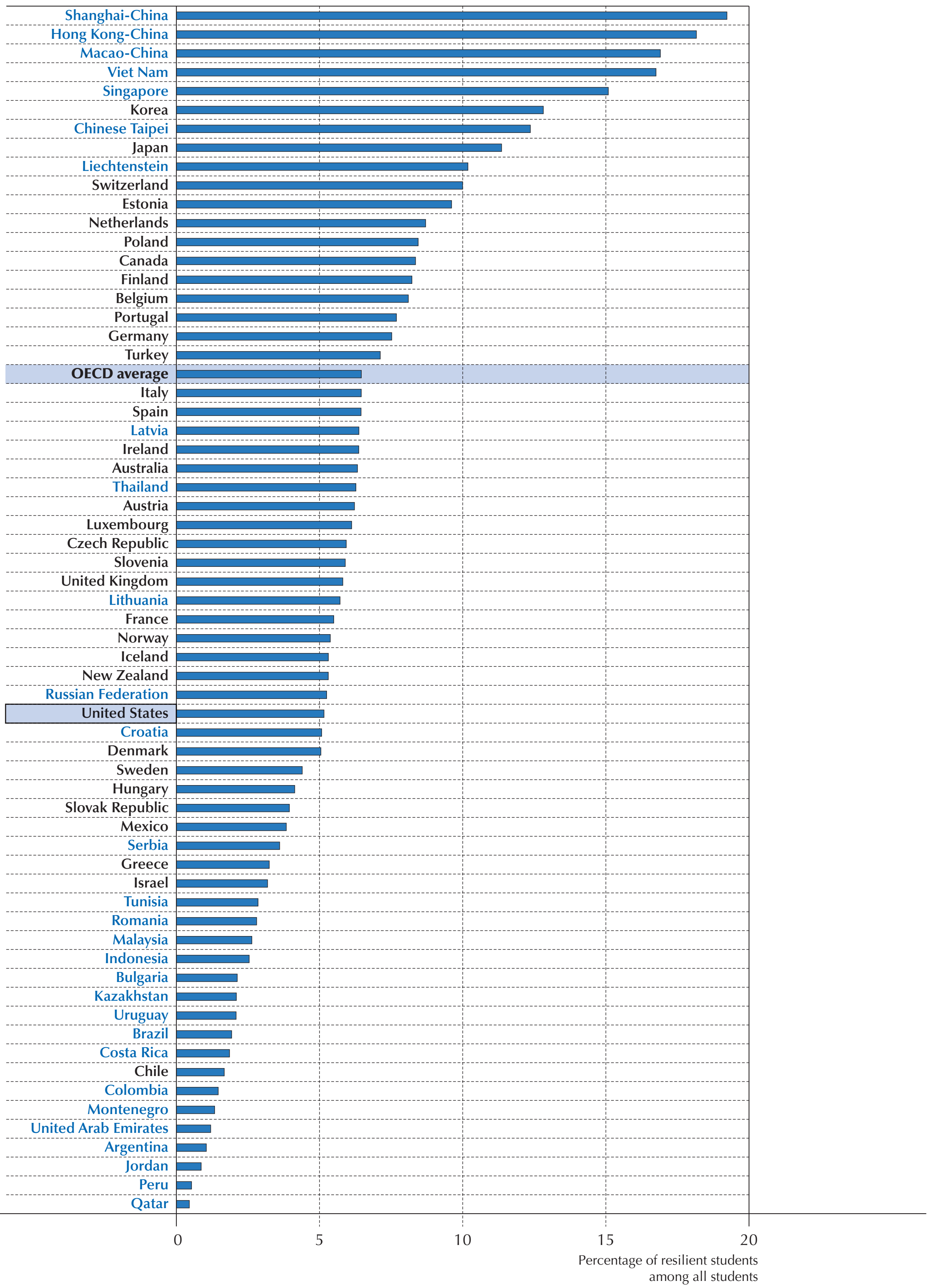
While it might be tempting to attribute countries' poorer performance to the challenges that immigrant inflows pose to the education system, the mathematics performance gap between students with and without an immigrant background is smaller in the United States than the average gap across OECD countries (OECD 2013b, Table II.3.4a). In fact after the socio-economic background of students is accounted for, immigrant students outperform non-immigrant students by 15 PISA score points and this relative performance of immigrant students has improved over time (OECD 2013b, Table II.3.4a). A similar picture is revealed using the language spoken at home as the basis for comparing student groups instead of immigrant background. Indeed, in the United States, there is no performance difference between immigrant students who do not speak the language of assessment at home and non-immigrant students who do. Among the countries that took part in the latest PISA assessment, Australia, Canada, New Zealand and Switzerland have larger immigrant intakes than the United States, but score significantly better overall.

- ***Concentration of disadvantage***: Generally, underperformance among immigrant students can be partly linked to the fact that these students tend to be concentrated in disadvantaged schools. When they move to a new country, people tend to settle in neighbourhoods with other immigrants, often of their own origin and socio-economic status. The PISA 2012 results suggest that, on average across countries, students who attend schools where the proportion of immigrant students is large perform as well as those who attend schools where the proportion of immigrant students is small, after the socio-economic profiles of the students and the school are taken into account. Across OECD countries, students who attend schools where the concentration of immigrants is high (i.e. where more than a quarter of students are immigrants) tend to perform worse than those in schools with no immigrant students. The observed difference between these two groups is 19 score points, but after adjusting for the socio-economic status of the students and schools, the difference is more than halved. The pattern is rather different in the United States, however, where students in schools where there is a high concentration of immigrant students perform, on average, at the same level as students in other schools, before and after adjusting for the socio-economic status of the students and the schools.

In general, the accuracy with which socio-economic background predicts student performance varies considerably across countries. Most of the students who perform poorly in PISA come from challenging socio-economic backgrounds, and yet some of their disadvantaged peers beat the odds and excel in PISA. These "resilient" students show that overcoming socio-economic barriers to achievement is possible.[8] While the prevalence of resilience is not the same across education systems, it is possible to identify substantial numbers of resilient students in practically all OECD countries. In the United States, 5% of students can be considered resilient, in the sense that they are among the 25% most socio-economically disadvantaged students but nevertheless perform much better than would be predicted by their socio-economic background. The average in the OECD is 7% (Figure 2.5). However, in Hong Kong-China, Macao-China, Shanghai-China and Viet Nam, the share of students who excel at school despite their disadvantaged background is about three times higher than it is in the United States.

■ Figure 2.5 ■

Percentage of resilient students



Note: A student is classified as resilient if he or she in the bottom quarter of the *PISA index of economic, social and cultural status* (ESCS) in the country of assessment and performs in the top quarter of students among all countries, after accounting for socio-economic status.
Countries and economies are ranked in descending order of the percentage of resilient students.
Source: OECD, PISA 2012 Database, Table II.2.7a.

THE COST OF THE ACHIEVEMENT GAP

The international achievement gap in education imposes an invisible yet recurring loss on the economy of the United States. Using economic modelling to relate cognitive skills – as measured by PISA and other international instruments – to economic growth shows (with some caveats) that even small improvements in the skills of a nation's labor force can have a large impact on that country's future well-being. A study carried out by the OECD (OECD, 2010b), in collaboration with the Hoover Institute at Stanford University, suggests that a modest goal of having the United States boost its average PISA scores by 25 points over the next 20 years – which corresponds to the performance gains that some countries achieved in the first ten years of PISA alone – could add USD 41 trillion to the United States economy over the lifetime of the generation born in 2010 (as evaluated at the start of reform in terms of the real present value of future improvements in GDP). Bringing the United States up to the average performance of Finland could result in gains on the order of USD 103 trillion. Narrowing the achievement gap by bringing all students to a baseline level of proficiency for the OECD (a PISA score of about 400) could increase the GDP of the United States by USD 72 trillion, according to historical growth relationships (OECD, 2010b).

Although there are uncertainties associated with these estimates, the gains from improved learning outcomes, in terms of current GDP, exceed today's value of the short-run business-cycle management. This is not to say that efforts should not be directed towards mitigating the short-term effects of the economic recession, but that long-term issues should not be neglected.

THE LEARNING ENVIRONMENT IN THE CLASSROOM AND AT SCHOOL

The effects of education policies and practices on student achievement depend heavily on how they translate into increased learning in the classroom. Results from PISA suggest that, across OECD countries, schools and countries where students work in a climate characterized by expectations of high performance and the readiness to invest effort, good teacher-student relations and high teacher morale tend to achieve better results on average across countries, and particularly in some countries.

PISA also shows that the socio-economic background of students and schools and key features of the learning environment are closely inter-related. Both link to performance in important ways, perhaps because students from socio-economically advantaged backgrounds bring with them a higher level of discipline and more positive perceptions of school values, or perhaps because parents' expectations of good classroom discipline are higher, and teacher commitment is stronger, in schools with advantaged socio-economic intakes. Conversely, disadvantaged schools may be under less parental pressure to reinforce effective disciplinary practices or replace absent or unmotivated teachers. In many countries, the effect of parental pressure is particularly closely related to socio-economic background, with little independent effect. However, factors related to the climate within the school, such as discipline and teacher-student relations, are also related to performance independently of any socio-economic and demographic variables. In summary, students perform better in schools with a more positive climate partly because such schools tend to have more students from advantaged backgrounds who generally perform well, partly because the favourable socio-economic characteristics of students reinforce the favourable climate, and partly for reasons unrelated to socio-economic variables.

PISA 2012 results examined disciplinary climate, teacher-student relations, teacher-related factors affecting school climate, student-related factors affecting school climate, students' sense of belonging, teacher morale, and the level of student truancy, including arriving late for school, skipping school and dropping out. The following sections examine some of the factors underlying these analyses in greater detail, as well as the performance of the United States in these areas.

Student truancy

Student truancy tends to be negatively related to a system's overall performance. Among OECD countries, after accounting for per capita GDP, systems with higher percentages of students who arrive late for school tend to have lower scores in mathematics, as do systems with higher percentages of students who skip school. Some 30% of 15-year-old students in the United States reported that they had arrived late for school at least once in the two weeks prior to the PISA test, slightly below the OECD average of 35%. By contrast, around 15% to 19% of students in Hong Kong-China, Liechtenstein, Shanghai-China and Viet Nam had arrived late at least once, and only 9% of students in Japan.

In the United States some 20% of students reported that they had skipped a day of school in the previous two weeks, above the OECD average of 15% and in contrast with Colombia, Hong Kong-China, Iceland, Ireland, Japan, Korea, Liechtenstein, Macao-China, the Netherlands, Shanghai-China, Switzerland and Chinese Taipei, where fewer than 5% of students did so (OECD 2013d, Tables IV.5.1 and IV.5.3).

School climate

Compared with averages for other countries, 15-year-olds in the United States view the relationships between students and teachers relatively positively. All the same, schools in the United States with better average performance tend to have a more positive student-teacher relationships, even after accounting for the socio-economic status and demographic background of students and schools and various other school characteristics.

Disciplinary climate is also consistently related to higher average performance at the school level. In 48 participating countries and economies schools with better average performance tend to have a more positive disciplinary climate, even after accounting for the socio-economic status and demographic background of students and schools and various other school characteristics. However, this relationship does not hold true for schools in the United States

Teacher-student relations

Positive teacher-student relations can help to establish an environment that is conducive to learning. Research finds that students, particularly disadvantaged students, tend to learn more and have fewer disciplinary problems when they feel that their teachers take them seriously. One explanation is that positive teacher-student relations help foster social relationships, create communal learning environments, and promote and strengthen adherence to norms conducive to learning. PISA asked students to indicate whether and to what extent they agree with several statements regarding their relationships with teachers at school, including whether they get along with their teachers, whether teachers are interested in their personal well-being, whether teachers take them seriously, whether teachers are a source of support if they need extra help and whether teachers treat them fairly. Students in the United States reported one of the best teacher-student relations among OECD countries (OECD 2013d, Figure IV.5.3). For example, over 80% of students in the United States agree or strongly agree that their teachers are interested in their well-being, whereas only 59% of students in Japan do so. As in the majority of countries, there is a positive relationship between teacher-student relations and student performance in the United States. For example, the 25% of students in the United States who reported the poorest relationships with their teachers are 1.4 times more likely to be also among the 25% of the poorest performing students. Differences in student-reported teacher interest in their well-being may reflect different student expectations of the level of involvement of their teachers, as well as different roles that teachers assume with respect to their students. In other words, students may disagree with these statements due to a possible mismatch between student expectations and what teachers are actually doing.

According to students' reports, teacher-student relations improved between 2003 and 2012 in all but one country, Tunisia, where they remained stable.

Disciplinary climate

The disciplinary climate in the classroom and school can also affect learning. Classrooms and schools with more disciplinary problems are less conducive to learning since teachers have to spend more time creating an orderly environment before instruction can begin. More interruptions within the classroom disrupt students' engagement and their ability to follow the lessons. PISA asked students to describe the frequency with which interruptions occur in mathematics lessons. The disciplinary climate is measured by how often students do not listen to the teacher during mathematics lessons; whether there is noise and disorder; if the teacher has to wait a long time for students to quiet down; if students cannot work well; and if students do not start working for a long time after the lesson begins. The majority of students in OECD countries enjoy orderly classrooms in their mathematics classes. Some 73% of students report that they never or only in some lessons feel that students do not start working for a long time after the lesson begins; 68% that they never or only in some lessons feel that students do not listen; 68% that noise never or only in some lessons affects learning; 72% that their teacher never or only in some lessons has to wait a long time before students settle down; and 78% of the students attend classrooms where they feel they can work well practically most of the time (OECD 2013d, Figure IV.5.4).

The United States does reasonably well on this measure, but well below Japan, for example, which shows a significantly better disciplinary climate. What is also noteworthy is that there is considerable variation on this measure among students in the United States, and the 25% of students who reported the poorest disciplinary climate are almost twice as likely to be poor performers. This odds ratio is the second highest among all OECD countries, after Israel, against OECD of 1.9 average odds ratio of 1.6 (OECD 2013d, Table IV.5.6).

Between 2003 and 2012, disciplinary climate, as reported by students, improved on average across OECD countries and across 27 individual countries, including the United States.

It is noteworthy that school principals judge disciplinary climate in the United States less positively than students do. The mismatch between these perspectives may indicate differences between what students and school principals perceive to be problems (OECD 2013d, Table IV.5.8).

Teacher-related factors affecting the school climate

To determine the extent to which teacher behavior influences student learning, PISA asked school principals to report the extent to which they perceive learning in their schools to be hindered by such factors as teachers' low expectations of students, poor student-teacher relations, absenteeism among teachers, staff resistance to change, teachers not meeting individual students' needs, teachers being too strict with students and students not being encouraged to achieve their full potential.

The United States performed around the OECD average on most of these measures. Interestingly only 32% of students in the United States are enrolled in schools whose principals reported that students' learning is hindered because teachers have to teach students of differing ability. This is a much lower percentage than across OECD countries, where the average is 55%. Nevertheless, considering that 24% of students in the United States are enrolled in schools whose principals reported that teachers do not meet individual students' needs, these findings do indicate a need to provide teachers with these skills through professional development. In contrast, only 5% of school principals see teachers being too strict with students as a problem, and 10% or less report teacher absenteeism or teachers being late for classes as a problem that hinders learning (Figure 2.6).

Teacher morale

To examine the level of teacher morale in school, school principals were asked to report whether and to what extent they agree with the following statements: the morale of teachers in this school is high, teachers work with enthusiasm, teachers take pride in the school, and teachers value academic achievement. In the United States, 81% of students attend schools whose principals agreed or strongly agreed that the morale of teachers in their schools is high, which is below the OECD average of 91%. For the other indicators of teachers' morale, the United States scores around the OECD average (OECD 2013, Figure IV.5.8).

Inter-relationships among learning-environment indicators at the school level

These indicators of school climate are inter-related. For instance, in virtually all school systems, schools with more negative disciplinary climates tend to have a higher incidence of student truancy (arriving late for school or skipping a day or a class). Also, schools whose principals reported that teachers' behavior negatively affects learning to a great extent also tend to be those whose principals reported that their teachers' morale is low. The United States is one of the countries where this relationship is particularly strong. Similarly, the United States is one of the countries with the strongest correlation between schools with a student population that is predominantly socio-economically disadvantaged and a more negative school disciplinary climate.

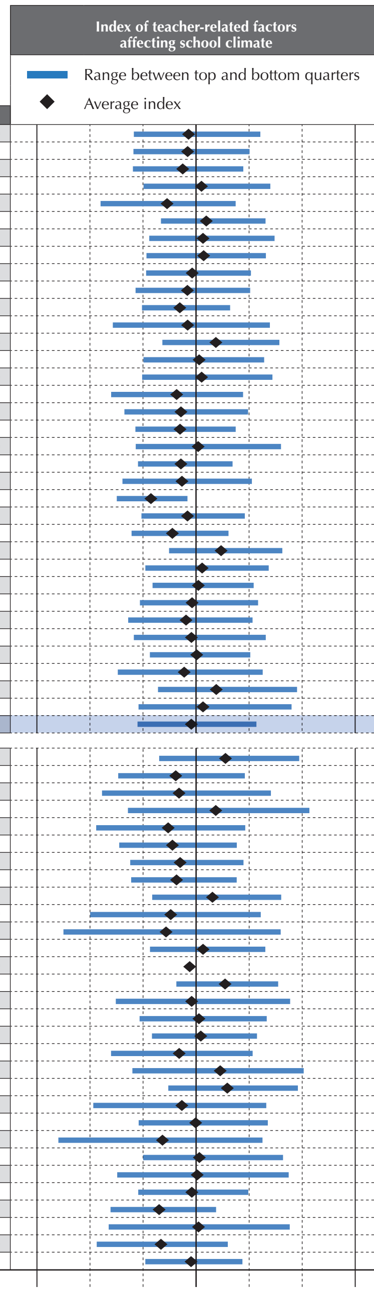
■ Figure 2.6 ■

School principals' views of how teacher behavior affects learning

A	Students not being encouraged to achieve their full potential
B	Poor teacher-student relations
C	Teachers having to teach students of heterogeneous ability levels within the same class
D	Teachers having to teach students of diverse ethnic backgrounds (i.e. language, culture) within the same class
E	Teachers' low expectations of students
F	Teachers not meeting individual students' needs
G	Teacher absenteeism
H	Staff resisting change
I	Teachers being too strict with students
J	Teachers being late for classes
K	Teachers not being well prepared for classes

Percentage of students in schools whose principals reported that the following phenomena hindered learning "not at all" or "very little"

		A	B	C	D	E	F	G	H	I	J	K	Variability in the index S.D.
OECD	Australia	85	91	66	83	81	65	87	64	94	94	90	0.99
	Austria	86	94	33	65	85	81	80	73	88	85	93	0.88
	Belgium	82	97	42	76	92	84	75	66	86	91	87	0.83
	Canada	90	95	62	80	94	78	91	66	92	99	96	0.97
	Chile	54	88	29	89	66	68	75	57	86	79	73	1.02
	Czech Republic	82	96	40	95	93	96	91	93	91	99	99	0.81
	Denmark	86	97	61	88	91	86	85	84	99	95	97	0.94
	Estonia	72	97	44	89	94	80	92	80	89	96	98	0.89
	Finland	93	95	30	81	97	80	83	78	96	95	96	0.78
	France	78	92	26	82	92	66	91	58	77	98	89	0.88
	Germany	87	98	41	79	92	85	70	75	93	92	96	0.71
	Greece	74	85	31	65	70	80	88	77	87	87	86	1.19
	Hungary	71	93	38	88	96	86	99	95	92	99	100	0.89
	Iceland	86	99	49	77	91	75	85	69	97	93	89	0.92
	Ireland	87	98	67	85	86	82	88	81	89	90	90	0.99
	Israel	75	79	45	83	79	73	74	79	86	83	82	1.02
	Italy	72	74	64	84	79	76	89	47	80	94	87	0.95
	Japan	72	90	28	96	80	74	97	69	81	93	87	0.81
	Korea	80	86	39	98	75	74	99	86	84	96	90	1.14
	Luxembourg	79	92	40	34	96	83	94	80	91	95	99	0.73
	Mexico	61	94	69	92	74	75	83	65	77	80	85	0.99
	Netherlands	35	93	41	85	75	29	60	54	89	84	82	0.53
	New Zealand	91	96	72	81	86	67	93	73	97	97	94	0.79
	Norway	75	90	30	76	82	56	70	74	99	87	94	0.80
	Poland	93	99	22	99	96	90	93	89	97	98	97	0.86
	Portugal	76	97	32	91	83	88	98	82	98	97	94	0.95
	Slovak Republic	79	98	38	85	88	92	92	84	76	99	96	0.76
	Slovenia	84	95	31	74	86	83	87	78	90	95	95	0.92
	Spain	71	94	34	71	78	76	95	68	85	91	93	0.94
	Sweden	79	93	55	70	81	74	79	79	97	97	92	1.02
	Switzerland	89	98	44	56	96	87	95	75	94	98	98	0.77
	Turkey	68	82	39	95	68	46	89	76	93	93	78	1.12
	United Kingdom	93	100	86	95	95	81	84	85	99	99	96	1.05
	United States	89	94	68	76	83	76	91	72	95	99	93	1.16
	OECD average	79	93	45	81	85	76	87	74	90	93	92	0.91
Partners	Albania	87	93	57	90	79	91	94	92	86	97	94	1.06
	Argentina	48	91	51	94	72	73	41	55	83	77	82	0.93
	Brazil	63	81	59	90	61	59	66	64	83	75	72	1.27
	Bulgaria	72	83	62	89	79	79	84	88	91	87	79	1.33
	Colombia	51	85	20	79	72	67	78	49	66	80	83	1.13
	Costa Rica	55	96	39	91	79	67	72	62	87	80	86	0.91
	Croatia	76	88	28	85	73	76	92	72	80	88	81	0.87
	Hong Kong-China	63	95	18	95	70	55	89	82	94	96	93	0.86
	Indonesia	58	99	48	72	94	97	97	98	96	96	97	0.99
	Jordan	72	77	45	71	64	70	57	65	75	75	70	1.28
	Kazakhstan	55	58	38	80	54	61	57	67	60	58	47	1.61
	Latvia	83	93	25	87	86	87	95	91	91	98	94	0.89
	Liechtenstein	100	93	57	48	100	93	88	74	93	100	100	0.66
	Lithuania	97	99	44	98	93	92	99	95	99	100	96	0.76
	Macao-China	62	83	54	93	78	57	84	82	84	87	78	1.31
	Malaysia	93	95	45	66	87	87	87	89	86	89	90	0.98
	Montenegro	71	100	50	91	78	86	94	84	96	92	97	0.79
	Peru	53	92	65	87	81	69	84	65	73	80	77	1.08
	Qatar	92	90	50	73	84	85	89	86	92	93	93	1.33
	Romania	91	91	79	92	91	94	94	93	92	95	96	0.99
	Russian Federation	45	80	44	92	68	64	74	65	76	76	66	1.27
	Serbia	64	92	61	92	71	88	93	75	88	85	80	0.98
	Shanghai-China	51	66	35	78	63	43	65	50	74	69	55	1.52
	Singapore	90	93	52	73	88	77	96	86	94	96	94	1.09
	Chinese Taipei	78	85	46	81	79	69	91	79	84	92	85	1.28
	Thailand	93	97	26	81	87	86	89	89	66	85	86	0.83
	Tunisia	41	76	42	94	59	66	36	61	71	65	88	0.81
	United Arab Emirates	79	84	61	76	80	73	80	76	82	87	83	1.38
	Uruguay	45	86	25	93	63	63	35	66	89	70	70	1.01
	Viet Nam	79	96	22	89	79	80	96	95	77	96	89	0.72



Note: Higher values on the index indicate better school climate.
Source: OECD, PISA 2012 Database, Table IV.5.7.

HOW SCHOOLING IS ORGANIZED

Governance of school systems

Many countries have pursued a shift in public and governmental concern away from merely controlling the resources and content of education and have focused increasingly on outcomes. Successive PISA assessments have revealed the changing distribution of decision-making responsibilities in education. In addition, school systems have made efforts to devolve responsibility to the frontline, encouraging responsiveness to local needs, and strengthening accountability.

Two important organizational features of school systems are the degree to which students and parents can choose schools, and the degree to which schools are considered autonomous entities that make organizational decisions independently of district, regional or national entities. PISA shows that school systems that grant more autonomy to schools to define and elaborate their curricula and assessments tend to perform better than systems that don’t grant such autonomy, even after accounting for countries’ national income. School systems that provide schools with greater discretion in deciding student-assessment policies, the courses offered, the content of those courses and the textbooks used are also school systems that perform at higher levels in mathematics, reading and science. In contrast, greater responsibility in managing resources appears to be unrelated to a school system’s overall performance.

Of course, the United States has a decentralized education system too. Many systems have decentralized decisions concerning the delivery of educational services while keeping tight control over the definition of outcomes, the design of curricula, standards and testing. The United States is different in that it has decentralized both inputs and control over outcomes. That has only just begun to change with the recent introduction and adoption by individual states of common core educational standards. Moreover, while the United States has devolved responsibilities to local authorities or districts, the schools themselves often have less discretion in decision making than is the case in many OECD countries. In this sense, the question for the United States is not just how many charter schools it establishes but how to build the capacity for all schools to exercise responsible autonomy, as happens in most successful systems.

One aspect of accountability is whether schools publicly post their achievement data. Data from PISA 2012 show that in those systems where a larger share of schools post their achievement data there is a positive relationship between school autonomy in resource allocation and student performance, whereas in systems where schools do not, the relationship is the other way around.

In school systems where schools do not post achievement data, a student who attends a school with greater autonomy in defining and elaborating curricula and assessment policies tends to perform seven points lower in mathematics than a student who attends a school with less autonomy in these areas, after students’ and schools’ socio-economic status and demographic profile are taken into account. In contrast, in a school system where all schools post achievement data publicly, a student who attends a school with greater autonomy scores eight points higher in mathematics than a student who attends a school with less autonomy (OECD 2013d, Figure IV.1.16).

The relationship between school autonomy and performance also appears to be affected by whether there is a culture of collaboration between teachers and principals in managing a school. Figure IV.1.17in OECD, 2013d shows that, in school systems where principals reported less teacher participation in school management (i.e. 1.5 index points lower than the OECD average), even after students’ and schools’ socio-economic status and demographic profile are taken into account, a student who attends a school with greater autonomy in allocating resources tends to score 16 points lower in mathematics than a student who attends a school with less autonomy. In contrast, in a school system where principals reported more teacher participation in school management (i.e. 1.5 index points higher than the OECD average), a student who attends a school with greater autonomy scores 9 points higher in mathematics than a student who attends a school with less autonomy.

■ Figure 2.7 ■

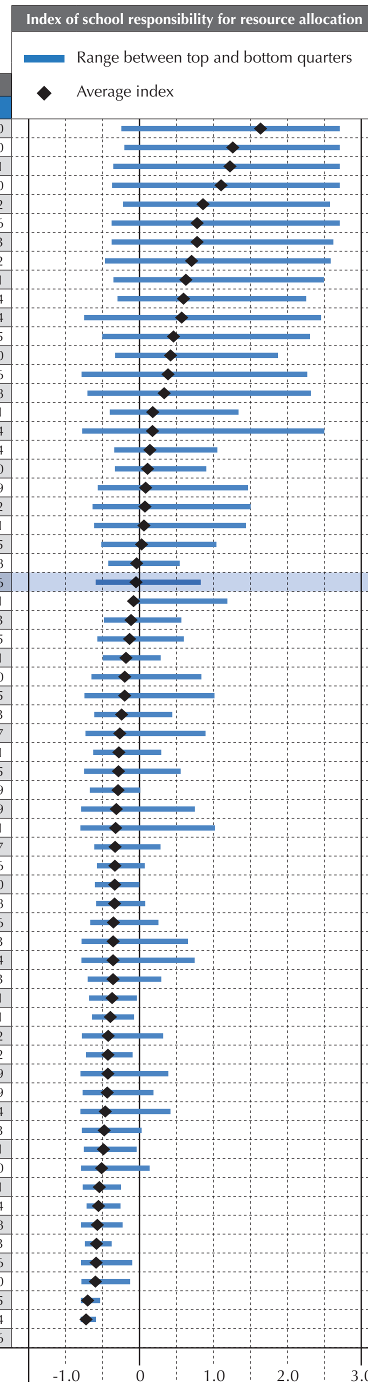
School autonomy over resource allocation

Percentage of students in schools whose principals reported that only “principals and/or teachers”, only “regional and/or national education authority”, or both “principals and/or teachers” and “regional and/or national education authority”, or “school governing board” has/have a considerable responsibility for the following tasks:

- A Selecting teachers for hire
- B Firing teachers
- C Establishing teachers’ starting salaries
- D Determining teachers’ salaries increases
- E Formulating the school budget
- F Deciding on budget allocations within the school

- 1 Only “principals and/or teachers”
- 2 Both “principals and/or teachers” and “regional and/or national education authority”, or “school governing board”
- 3 Only “regional and/or national education authority”

	A			B			C			D			E			F			Variability in the index
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	S.D.
Macao-China	61	37	2	48	49	4	24	72	4	15	81	4	32	68	0	32	68	0	1.2
Netherlands	92	8	0	54	46	0	35	53	12	43	40	17	55	45	0	73	27	0	1.2
Czech Republic	95	5	0	94	6	0	74	18	8	72	22	6	56	36	9	78	21	1	1.4
United Kingdom	52	48	0	23	71	7	31	49	20	19	67	15	12	79	9	49	51	0	1.2
Bulgaria	92	7	1	90	9	1	55	26	18	65	30	5	25	41	33	60	38	2	1.1
Slovak Republic	95	5	0	92	8	0	45	13	42	48	19	33	50	27	23	63	31	6	1.2
Lithuania	82	18	0	84	16	0	38	39	22	33	45	21	15	64	21	30	57	13	1.2
Thailand	32	54	13	39	48	12	22	33	44	54	39	7	32	59	9	45	53	2	1.2
Sweden	90	10	0	44	35	22	40	24	36	52	40	8	45	44	11	86	13	1	1.2
Latvia	92	8	0	88	12	0	29	27	44	33	33	34	34	61	5	31	66	4	1.1
Chile	38	42	20	29	40	31	17	42	41	17	43	40	20	56	24	25	61	14	1.3
Hungary	68	32	0	73	27	0	32	16	52	28	23	49	34	43	23	30	65	5	1.1
Hong Kong-China	52	48	1	14	83	3	7	41	52	4	32	64	35	65	1	39	61	0	1.0
United Arab Emirates	31	29	40	27	35	38	20	37	43	16	43	42	23	51	25	24	50	26	1.2
Indonesia	20	31	48	16	35	48	15	34	51	17	37	46	44	50	6	46	46	8	1.3
Denmark	51	49	0	63	32	5	15	15	70	12	19	69	40	52	8	22	77	1	0.9
Peru	26	28	46	23	20	57	23	4	74	21	5	74	41	40	19	41	45	14	1.4
Estonia	84	16	0	90	10	0	11	14	74	14	30	55	34	54	11	61	35	4	0.8
New Zealand	75	25	0	28	71	0	10	9	82	15	24	61	23	77	0	46	54	0	0.7
United States	59	39	2	37	57	6	3	51	46	2	54	44	6	71	24	30	61	9	0.9
Chinese Taipei	66	24	10	54	36	10	10	14	76	16	14	71	29	34	37	53	35	12	1.0
Australia	63	20	17	39	17	43	8	12	80	9	14	77	38	47	15	62	37	1	1.0
Russian Federation	94	6	0	91	9	0	23	27	50	11	43	46	9	36	55	23	62	15	0.8
Iceland	96	3	1	92	7	1	8	15	77	8	11	81	50	37	13	61	31	8	0.6
OECD average	49	27	24	36	30	34	11	15	73	12	19	69	24	48	28	45	49	6	0.7
Liechtenstein	6	87	6	6	80	13	6	28	65	6	46	47	6	57	37	89	0	11	0.9
Slovenia	93	7	0	63	32	5	7	15	78	10	28	62	13	62	25	26	71	3	0.7
Switzerland	44	54	2	31	58	11	8	15	77	8	23	69	10	63	28	49	46	5	0.6
Norway	82	14	4	55	20	25	5	7	88	2	11	87	54	28	18	75	24	1	0.4
Luxembourg	11	59	30	13	54	33	1	20	79	1	20	79	13	69	18	17	83	0	0.8
Tunisia	32	12	57	31	9	61	28	7	66	28	6	67	33	23	43	40	35	25	0.8
Israel	70	26	3	55	33	13	4	9	86	8	12	80	17	29	54	59	28	13	0.6
Japan	14	19	67	8	25	67	2	29	70	3	32	65	18	28	54	65	27	7	0.8
Finland	41	45	14	23	36	41	7	8	85	7	15	78	31	39	30	87	12	1	0.6
Shanghai-China	34	56	10	19	61	20	2	22	76	5	26	69	15	46	39	26	69	5	0.7
Belgium	57	32	10	32	54	14	0	4	96	0	3	96	18	61	21	32	59	9	0.3
Mexico	26	20	54	16	18	65	6	13	80	6	13	81	31	32	37	44	36	19	0.8
Brazil	18	12	70	17	11	72	11	6	83	11	6	84	15	22	63	14	35	51	1.0
Kazakhstan	81	17	2	76	23	1	19	12	69	4	11	86	8	15	77	11	22	67	0.6
Montenegro	91	9	0	86	7	7	2	0	98	18	1	82	4	41	54	18	66	16	0.5
Croatia	22	77	1	24	73	2	1	1	98	1	2	97	8	68	25	11	80	10	0.3
Poland	80	18	2	76	21	3	7	12	81	5	14	81	4	44	52	25	47	28	0.4
Canada	48	38	14	11	33	56	2	16	82	2	17	82	21	42	37	65	29	6	0.6
Costa Rica	14	7	79	12	7	81	6	9	85	5	8	86	18	63	19	20	78	3	0.9
Colombia	19	3	78	16	5	79	13	2	85	9	3	88	25	40	36	27	68	4	0.9
Singapore	8	36	55	8	37	54	1	8	90	2	29	69	22	59	19	40	57	3	0.7
Qatar	34	50	16	30	50	20	5	46	50	5	44	51	10	56	34	26	53	21	0.4
Serbia	28	69	2	33	64	4	3	4	92	7	12	82	1	35	64	12	78	11	0.3
Spain	22	12	66	19	16	65	2	3	94	3	5	92	30	55	15	30	68	2	0.6
Ireland	19	68	13	1	76	23	0	4	96	0	5	95	11	66	24	36	51	12	0.2
Viet Nam	15	26	60	9	24	67	6	9	84	21	16	63	25	19	56	33	18	49	0.7
Korea	38	13	49	27	14	59	7	3	91	4	3	93	15	33	52	41	50	9	0.6
Uruguay	8	17	76	4	20	76	1	20	79	1	19	81	5	30	65	18	37	44	0.7
Portugal	21	55	24	14	16	69	1	8	91	1	8	91	23	59	18	33	64	3	0.5
Malaysia	7	13	79	4	14	83	1	6	94	3	14	83	60	24	16	57	22	21	0.5
Jordan	5	8	86	6	10	85	3	8	89	3	10	87	29	48	23	29	51	20	0.6
France	9	22	70	2	15	84	0	3	97	0	6	94	14	66	20	14	85	1	0.3
Austria	19	36	46	6	24	70	1	6	93	2	8	90	4	26	70	62	34	4	0.4
Romania	9	58	33	7	51	42	5	29	66	8	24	68	7	45	48	7	55	38	0.3
Germany	20	44	36	3	21	76	0	2	98	2	15	84	0	15	85	32	65	3	0.1
Italy	7	8	86	9	10	81	3	4	93	3	4	93	5	18	77	17	77	6	0.6
Albania	6	7	87	5	13	83	5	4	91	7	8	85	6	62	31	9	81	10	0.5
Greece	1	5	94	1	5	94	0	5	95	0	4	96	11	68	21	22	62	15	0.2
Turkey	1	6	93	1	5	94	0	2	98	0	2	98	6	73	21	7	79	14	0.1
Argentina	m	m	m	13	34	52	1	13	86	1	10	89	10	35	55	18	46	36	m



Countries and economies are ranked in descending order of the average index.
Source: OECD, PISA 2012 Database, Table IV.4.1.

■ Figure 2.8 ■

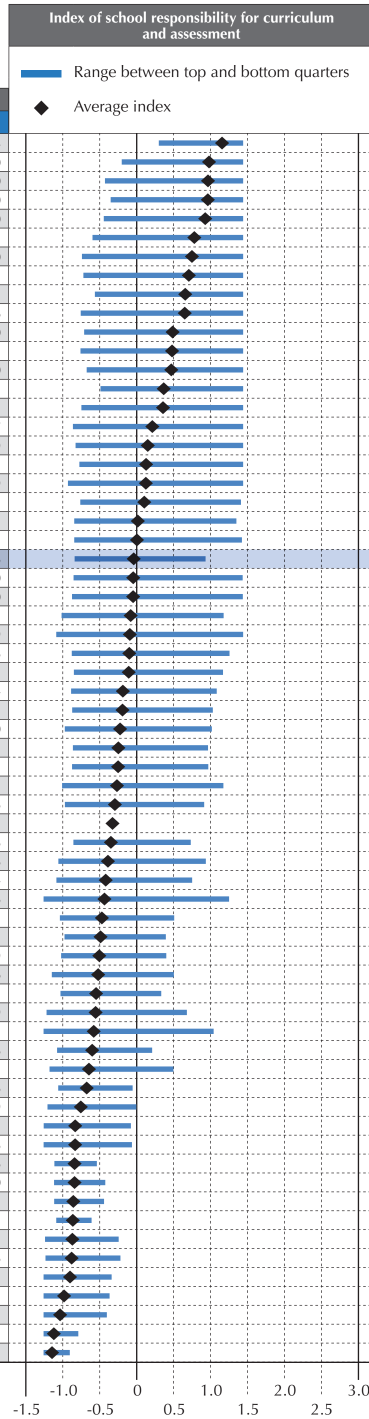
School autonomy over curricula and assessments

Percentage of students in schools whose principals reported that only "principals and/or teachers", only "regional and/or national education authority", or both "principals and/or teachers" and "regional and/or national education authority", or "school governing board" has/have a considerable responsibility for the following tasks:

- A Establishing student assessment policies
- B Choosing which textbooks are used
- C Determining course content
- D Deciding which courses are offered

- 1 Only "principals and/or teachers"
- 2 Both "principals and/or teachers" and "regional and/or national education authority", or "school governing board"
- 3 Only "regional and/or national education authority"

	A			B			C			D			Variability in the index
	1	2	3	1	2	3	1	2	3	1	2	3	S.D.
Japan	98	2	0	89	7	4	89	7	4	90	6	4	0.7
Thailand	42	54	4	47	53	0	76	24	1	63	37	0	0.7
Netherlands	95	5	0	93	7	0	91	7	2	75	25	0	0.8
Hong Kong-China	87	13	0	84	16	0	76	24	0	63	37	0	0.8
United Kingdom	62	38	0	100	0	0	83	14	3	70	30	0	0.8
Macao-China	66	34	0	81	19	0	66	33	2	36	61	2	0.9
Czech Republic	58	42	0	90	10	0	74	26	0	78	22	0	1.0
Korea	69	29	2	50	50	0	76	20	3	60	36	5	0.9
Lithuania	34	65	1	54	46	0	54	36	10	48	51	1	0.9
Indonesia	82	16	2	80	16	4	73	16	11	62	22	16	1.0
Estonia	39	61	1	70	30	0	35	62	2	48	52	0	0.9
Slovak Republic	76	22	2	68	27	5	61	35	3	56	42	3	1.0
New Zealand	58	38	4	96	4	0	71	28	1	71	29	0	0.9
Poland	57	43	0	82	18	0	83	17	0	36	33	31	0.8
Italy	79	21	0	90	10	0	60	27	12	29	55	15	0.9
Chinese Taipei	27	65	9	67	33	0	54	43	3	30	63	7	0.9
Iceland	63	36	0	77	23	0	51	37	11	39	52	9	1.0
Australia	56	40	3	81	18	0	36	48	16	63	36	2	0.9
Chile	46	51	3	57	36	7	37	35	27	31	60	9	1.0
Ireland	47	51	2	82	18	0	32	40	28	24	75	1	0.8
Hungary	35	64	1	57	43	0	26	59	14	10	65	25	0.9
Israel	57	42	1	45	50	5	47	49	4	30	64	5	0.9
OECD average	47	41	13	65	27	8	40	36	24	36	46	18	0.8
Finland	50	40	10	89	11	0	34	42	24	49	41	10	0.9
Denmark	38	51	11	57	43	0	45	47	8	20	70	10	0.9
Colombia	18	73	9	65	29	6	43	34	23	40	38	22	0.9
Peru	59	32	9	47	16	36	53	28	19	35	26	39	1.0
France	35	50	15	75	25	0	45	38	17	45	37	18	0.9
Belgium	56	40	4	83	15	2	30	45	25	25	62	13	0.8
Latvia	44	52	5	61	38	1	22	40	38	33	54	14	0.8
Germany	40	58	2	40	58	2	21	51	28	52	45	3	0.8
Russian Federation	17	73	10	45	52	3	19	64	17	30	61	10	0.8
Sweden	43	53	3	94	6	0	33	48	20	24	42	33	0.8
Singapore	17	83	0	26	72	2	20	66	15	20	75	5	0.8
Albania	46	22	32	81	15	4	35	30	34	33	35	32	0.9
Austria	38	38	23	60	40	0	35	39	26	10	72	18	0.8
Liechtenstein	54	46	0	16	78	6	6	74	20	9	78	13	0.9
Slovenia	41	55	4	55	44	1	25	63	12	20	73	8	0.7
United States	16	68	16	25	60	15	15	58	26	30	62	8	0.9
Brazil	20	58	22	73	25	2	30	35	35	13	33	54	0.8
United Arab Emirates	35	33	32	28	26	45	26	24	50	25	27	48	1.0
Spain	39	37	24	80	19	1	26	31	43	23	34	42	0.7
Canada	25	58	17	44	43	13	19	39	42	46	51	3	0.7
Argentina	59	33	8	81	18	1	24	36	41	6	24	69	0.7
Romania	22	55	24	38	42	20	26	43	31	16	57	26	0.7
Norway	35	35	29	85	14	1	23	43	34	15	35	51	0.7
Shanghai-China	25	69	6	21	40	39	20	48	32	18	53	29	0.8
Tunisia	27	28	45	29	9	63	28	15	58	29	10	62	1.0
Switzerland	47	42	11	37	38	25	17	46	37	11	61	28	0.6
Costa Rica	41	20	39	69	14	17	20	11	69	13	12	75	0.8
Portugal	18	63	19	79	21	0	6	28	66	10	72	18	0.5
Kazakhstan	34	49	17	16	33	52	7	39	55	16	65	19	0.6
Uruguay	13	45	43	25	41	34	8	33	59	5	42	53	0.6
Montenegro	65	2	33	20	2	78	24	2	75	23	9	68	0.6
Luxembourg	6	49	44	17	69	14	5	65	30	11	71	18	0.4
Bulgaria	18	56	26	45	55	1	8	32	60	2	58	40	0.4
Croatia	17	45	38	49	45	7	10	45	45	4	23	73	0.4
Serbia	51	42	7	34	54	12	5	34	61	0	15	85	0.2
Mexico	33	32	35	51	18	31	12	12	75	4	11	85	0.5
Malaysia	25	23	52	18	9	73	7	9	84	45	28	28	0.6
Qatar	5	48	47	17	46	36	10	44	45	14	40	45	0.5
Viet Nam	12	23	65	20	18	61	8	15	77	18	17	65	0.5
Jordan	14	27	58	6	6	87	7	4	89	6	13	81	0.6
Turkey	2	11	87	4	38	58	4	7	89	4	44	52	0.3
Greece	29	10	61	5	6	89	2	3	95	4	3	93	0.3



Countries and economies are ranked in descending order of the average index.
Source: OECD, PISA 2012 Database, Table IV.4.3.

School choice

Students in some school systems are assigned to attend their neighborhood school. However, in recent decades, reforms in many countries have tended to give greater choice to parents and students, to enable them to choose the schools that meet their children's educational needs or preferences. On the premise that students and parents have adequate information and choose schools based on academic criteria or program quality, the competition for schools creates incentives for institutions to organize programs and teaching in ways that better meet diverse student requirements and interests, thus reducing the cost of failure and mismatches. In some school systems this competition has financial stakes for schools, with schools not only competing for enrolment, but also for funding. This could be through direct public funding of independently managed institutions, based on student enrolments or student credit-hours. Another model is to give money to students and their families (through scholarships or vouchers, for example) to spend on the public or private educational institutions of their choice.

The degree of competition among schools is one way to measure school choice. Competition among schools is intended to provide incentives for schools to innovate and create more effective learning environments.

According to principal's responses, 76% of students attend schools competing with at least one other school for enrolment across OECD countries. The same figure is also reported for the United States. Among OECD countries, only in Iceland, Finland, Norway and Switzerland do less than 50% of students attend schools that compete with other schools for enrolment. In contrast, in Australia, Belgium, Japan, Korea, the Netherlands, New Zealand, and the United Kingdom, over 90% of students attend schools that compete with other schools for enrolment (OECD 2013d, Table IV4.4).

Cross-country correlations in PISA do not show a relationship between the degree of competition and student performance (OECD, 2013d: Table IV.1.4). In 28 countries and economies, schools that compete for student enrolment with other schools tend to show better performance than schools that do not compete, before accounting for schools' socio-economic intake, though this is not the case in the United States. However once the socio-economic status and demographic background of the schools and students are taken into account, only in the Czech Republic, Estonia, Macao-China and Montenegro do schools that compete for students tend to perform better on average (OECD 2013d,Table IV.1.12c).

On the other hand, the results indicate a weak negative relationship between the degree of competition and equity. Among OECD countries, systems with more competition among schools tend to show a stronger impact of students' socio-economic status on their performance in mathematics. Caution is advised when interpreting this result, as the observed relationship could be affected by a few outliers.[9] But this finding is consistent with research showing that school choice – and, by extension, school competition – is related to greater levels of segregation in the school system, which may have adverse consequences for equity in learning opportunities and outcomes.

Public and private schools

Schooling mainly takes places in public institutions. These are defined by PISA as schools managed directly or indirectly by a public education authority, government agency, or governing board appointed by government or elected by public franchise. With an increasing variety of education opportunities, programs and providers, governments are forging new partnerships to mobilize resources for education and to design new policies that allow the different stakeholders to participate more fully and to share costs and benefits more equitably. Private education is not only a way of mobilizing resources from a wider range of funding sources; it is sometimes also regarded as a way of making education more cost-effective. Publicly financed schools are not necessarily also publicly managed. Instead, governments can transfer funds to public and private educational institutions according to various allocation mechanisms.

Across OECD countries, 18% of students are enrolled in privately managed schools that are either privately or government funded, although in many countries government authorities retain significant control over these schools, including the power to shut down non-performing schools. Enrolment in privately managed schools exceeds 50% of 15-year-old students in Chile, Ireland and the Netherlands, and between 35% and 50% in Australia, Korea and the United Kingdom. In contrast, in Iceland, Israel, Norway and Turkey, more than 98% of students attend schools that are publicly managed (OECD 2013d, Table IV.4.7).

Across OECD countries and all countries and economies that participated in PISA 2012, the percentage of students enrolled in private schools is not related to a system's overall performance (OECD 2013d, Table IV.1.4). At the school level, privately managed schools show a performance advantage of 28 points on the PISA reading scale, on average

across OECD countries, although in the United States the advantage is smaller and not statistically significant. However, once the socio-economic background of students and schools is accounted for, public schools come out with a slight advantage of seven points, on average across OECD countries. In the United States, once socio-economic background is accounted for, public schools show superior performance compared with private schools, amounting to 27 points.

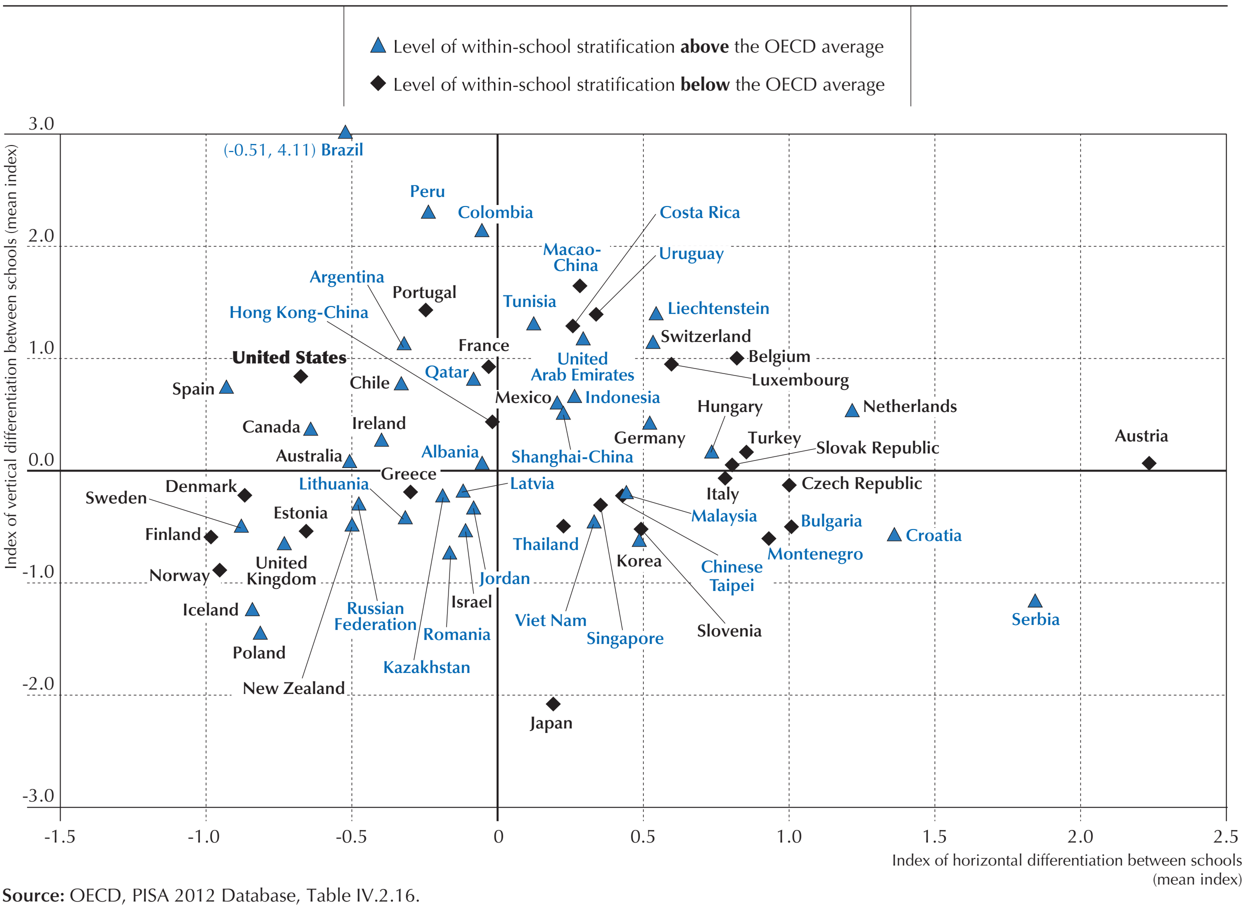
Selection of students into schools, grades and programs

While teaching and learning are at the heart of schooling, they are supported by a complex organization responsible for everything from selecting and admitting students to schools and classrooms to evaluating their progress; formulating curricula; promoting successful approaches to teaching and learning; creating incentives to motivate students and teachers; and deciding on the distribution of financial, material and human resources – all with the aim of providing quality education. This section looks at how school systems are organized to allocate students to programs, schools and classes. It considers horizontal and vertical forms of stratification.

Horizontal stratification can be adopted by the school system or by individual schools, groups students according to their interests and/or performance. School systems make decisions on offering specific programs (vocational or academic, for example), setting the age at which students are admitted into these programs, and determining the extent to which students' academic records are used to select students for their schools. Individual schools make decisions about whether to transfer students out of the school because of poor performance, behavioral problems or special needs, and whether to group students in classes according to ability. Vertical stratification refers to the ways in which students progress through school as they become older. Even though the student population is differentiated into grade levels in practically all schools that participate in PISA, in some countries, all 15-year-old students attend the same grade level, while in other countries they are dispersed throughout various grade levels as a result of policies governing the age of entrance into the school system and/or grade repetition

■ Figure 2.9 ■

Vertical and horizontal stratification



Source: OECD, PISA 2012 Database, Table IV.2.16.

Figure 2.9 plots countries according to the degree to which there is horizontal and vertical stratification. Countries and economies in the top right quadrant are those that have higher levels of vertical and horizontal (between-school) stratification than the OECD average. Countries and economies in the bottom left quadrant of the chart are those that have lower levels of vertical and horizontal (between-school) stratification than the OECD average. This shows the United States to be above average vertical stratification but below average horizontal stratification.

PISA shows that the degree of school systems' vertical stratification tends to be negatively related to how equitable the education outcomes are. In systems where 15-year-old students are found in different grade levels, the impact of students' socio-economic status on their academic performance is stronger than in systems with less vertical stratification. Across OECD countries, 32% of the variation in the impact of students' socio-economic status on their mathematics performance can be explained by differences in the degree of vertical stratification within the system, after accounting for per capita GDP (OECD 2013d, Table IV.1.1).[10] On the other hand, across OECD countries there is no clear relationship between vertical stratification and average performance of the system after accounting for per capita GDP.[11]

Grade repetition is a feature of vertical stratification in some countries. Requiring that students repeat grades implies some cost, not only the direct cost of providing an additional year of education, but also the opportunity cost to society of delaying that student's entry into the labor market by at least one year (OECD, 2011). Across OECD countries, an average of 12% of students reported that they had repeated at least on grade in primary, lower secondary or upper secondary school. The rate of grade repetition in the United States is similar to the OECD average. Grade repetition tends to be negatively related to equity, and this is especially obvious when the relationship is examined across OECD countries (OECD 2013d, Figure IV.1.4). Across OECD countries, 20% of the variation in the impact of students' socio-economic status on their mathematics performance can be explained by differences in the proportion of students who repeated a grade, even after accounting for per capita GDP. At the same time, across OECD countries, grade repetition is unrelated to the system's overall performance.

In comprehensive school systems, all 15-year-old students follow the same program, while in differentiated school systems, students are streamed horizontally into different programs. Differentiated systems must also decide at which age students will be sorted into different programs. On average across OECD countries, school systems begin selecting students for different programs at the age of 14. However, this varies greatly across countries, from age 10 in Austria and Germany, to age 16 in a number of OECD countries, including the United States. When it comes to the number of school types or distinct educational programs available to 15-year-old students, the United States follows the most common practice among OECD countries of offering only one type of school or program. This is in contrast to the Czech Republic, the Netherlands and the Slovak Republic where five or more programs are available.

In general, this type of between-school horizontal stratification is unrelated to a system's average performance. The exception is that, across all participating countries and economies, systems that group students within schools for all classes based on their ability tend to have lower performance after accounting for per capita GDP (with a partial correlation coefficient of -0.25). Horizontal stratification is also negatively related to equity in education opportunities. The impact of the socio-economic status of students and/or schools on performance is stronger in school systems that sort students into different tracks, where students are grouped into different tracks at an early age, where more students attend vocational programs, where more students attend academically selective schools, or where more students attend schools that transfer low-performing students or students with behavior problems to another school. Across OECD countries, 47% of the variation in the impact of socio-economic status of students and schools on students' mathematics performance can be explained by differences in the ages at which students are selected into different programs, even after accounting for per capita GDP (OECD 2013d, Table IV.1.1).

The age at which stratification begins may be closely associated with the impact of socio-economic status on performance because the frequency and the nature of student selections/transitions differ between early- and late-stratified systems. In systems that stratify students early, students might be selected more than once before the age of 15. When students are older, more information on individual students is available, and decisions on selecting and sorting students into certain tracks are thus better informed and teachers and parents have enough information to make more objective judgments. In addition, students are more dependent upon their parents and their parents' resources when they are younger. In systems that stratify students early, parents with more advantaged socio-economic status may be in a better position to promote their children's chances than disadvantaged parents.

As expected, schools that select students based on students' academic performance tend to show better average performance, even after accounting for the socio-economic status and demographic background of students and schools and various other

school characteristics, on average across OECD countries (OECD 2013d, Table IV.1.12c). However, the performance of a school system overall is not better if it has a greater proportion of academically selective schools. In fact, in systems with more academically selective schools, the impact of the socio-economic status of students and schools on student performance is stronger (OECD 2013d, Table IV.1.1).

ASSESSMENT AND ACCOUNTABILITY ARRANGEMENTS

Education standards

The shift in public and government concern towards a focus on outcomes has, in many countries, led to the establishment of quality standards for educational institutions. In most OECD countries, evaluation and assessment systems concentrate not only on the students, but also on teachers and school leaders. Countries pursue a range of approaches to standard setting, from defining broad education goals to formulating precise performance expectations in well-defined subject areas. The use of performance data to improve teaching and learning has also expanded in recent years (OECD, 2013g).

Education standards have influenced OECD education systems in various ways. They have helped to establish rigorous, focused and coherent content at all grade levels. They have also reduced overlaps in curricula across grades and reduced the variation in the way curricula are implemented across classrooms. Standards facilitate the co-ordination of policy drivers ranging from curricula to teacher training and reduce inequity in curricula across socio-economic groups. The United States has suffered from wide discrepancies between state standards and test scores that have led to non-comparable results. These discrepancies often mean that a school's fate depends more than anything else on where it is located and, perhaps even more importantly, that students across the United States are not equally well prepared to compete in the United States labor market. The establishment of the "Common Core Standards" in the United States could be a step towards addressing these problems and indeed 46 states and the District of Columbia have signed up to the standards. Chapter 4 of this report will turn to examine the extent to which PISA mathematics corresponds to the Common Core State Standards for Mathematics.

PISA 2012 collected data on the nature of accountability systems and the ways in which the resulting information was used and made available to various stakeholders and the general public.

Examinations

Countries and economies implement different policies to evaluate their students' performance. System-wide evaluations can generally be classified into those that do not have direct consequences for students (assessments) and those that do (examinations). Assessments can be used to take stock of students' performance in order to make decisions on future instruction or to summarize performance for information purposes. Although assessments can be used to, for example, decide on allocation of resources to low-performing schools or tailor instruction to low-performing students, assessment results do not have direct tangible consequences for students. Results from examinations, by contrast, can be used to determine students' progression to higher levels of education (for example, the transition from lower to upper secondary school), selection into different curricular programs (for example, into vocational or academic programs), or selection into university programs. Assessments and examinations provide students with benchmarks, and, in the case of examinations, with incentives to work hard in school in order to pass.

All PISA-participating countries and economies have an assessment or examination system in place.[12] However, the characteristics of these systems can vary greatly in terms of the emphasis given to examinations versus assessments and the stages of a students' schooling when they are implemented.

Countries and economies can be grouped into four categories of assessment-and-examination systems as shown in Figure 2.10. A first group of countries and economies tends to have assessments at the lower secondary level and national examinations at the upper secondary level, with few tertiary fields of study requiring a special examination for admission. A second group of countries and economies tends to have national examinations at both the upper and secondary levels. A third group of countries and economies tends to rely on not only national examinations, but also other types of examinations or on other types of examinations only. The fourth group of countries and economies tends to have no examinations at the lower or upper secondary level, but a large number of tertiary fields of study require examinations.[13] The United States is one of only three OECD countries in the third group that has a mix of national or other non-national examinations in lower or upper secondary.

Among OECD countries, 12 school systems conduct national examinations in lower secondary school and 21 do so in upper secondary school; all partner countries and economies conduct them in upper secondary school. At the lower

secondary level, these examinations are, in all cases, used to certify students' graduation or grade completion. In Norway and Poland, these examinations are used to determine access to selective upper secondary schools; and in Scotland, Norway and Ireland they are used to select students into certain programs, courses or tracks in upper secondary school. In all OECD countries, the results from these examinations are shared directly with students. They are also shared with an external audience in addition to education authorities, with school administrators (except in Italy), and directly with parents (except in Germany). In all OECD countries except in general programs in Poland, upper secondary examinations are used to certify completion or graduation. Except in the United States and in pre-vocational and vocational programs in Hungary and Spain, they are also used to determine students' access to tertiary education. In 15 OECD countries upper secondary examinations are also used to determine student selection for fields of study at the tertiary level (OECD 2013d, Tables IV.4.22 and IV.4.23).

■ Figure 2.10 ■

Country profile: Assessments and examinations

Assessment in lower secondary, national exams in upper secondary, few fields requiring tertiary exams	Only national exams in lower and upper secondary	National or other non-national examinations in lower or upper secondary	No national or other examinations, most fields requiring tertiary exams
Australia	Albania	Belgium (Fr. Comm.)	Austria
Croatia	Bulgaria	Liechtenstein	Belgium (Fl. Comm.)
Czech Republic	Denmark	Montenegro	Brazil
England (UK)	Estonia	Norway	Chile
Finland	France	Qatar	Colombia
Hong Kong-China	Germany	United Arab Emirates	Greece
Hungary	Indonesia	United States	Iceland
Israel	Ireland		Japan
Luxembourg	Italy		Korea
Scotland (UK)	Jordan		Macao-China
Singapore	Latvia		Mexico
Slovak Republic	Lithuania		Peru
Tunisia	Malaysia		Spain
	Netherlands		Sweden
	Poland		Turkey
	Portugal		Uruguay
	Romania		
	Russian Federation		
	Shanghai-China		
	Chinese Taipei		
	Thailand		
	Viet Nam		

Source: OECD, PISA 2012 Database, Tables IV.4.20, IV.4.21, IV.4.22, IV.4.23, IV.4.24, IV.4.25 and IV.4.26.

The use of achievement data beyond school

While performance data in the United States are often used for purely accountability purposes, other countries tend to give greater weight to using them to guide intervention, reveal best practices and identify shared problems. Where school performance is systematically assessed, the primary purpose is often not to support an evaluation of public services or to support market mechanisms in the allocation of resources; rather it is to reveal best practices and identify common problems in order to encourage teachers and schools to develop more supportive and productive learning environments. To achieve this, many education systems try to develop assessment and accountability systems that include progressive learning targets that explicitly describe the steps that learners follow as they become more proficient, and define what a student should know and be able to do at each level of advancement. The trend among OECD countries is towards multi-layered, coherent assessment systems from classrooms to schools to regional to national to international levels. These assessment systems support improvement of learning at all levels of the system and are increasingly performance-based. They add value for teaching and learning by providing information that can be acted on by students, teachers, and administrators and are part of a comprehensive and well-aligned learning system that includes syllabi, associated instructional materials, matching exams, professional scoring and teacher training.

Achievement data can offer accountability when they are shared with stakeholders beyond the school, teachers, partners and students. School principals were asked to report on whether achievement data are posted publicly, or tracked over time by an administrative authority. On average across OECD countries, 45% of students are in schools whose principals reported that achievement data are posted publicly. In the United States as well as in the Netherlands, New Zealand,

Sweden and the United Kingdom over 80% of students attend such schools, while in Argentina, Austria, Belgium, Japan, Macao-China, Shanghai-China and Uruguay, fewer than 10% of students do (OECD 2013d, Table IV.4.31).

In most countries, tracking achievement data over time seems to be a more common practice than posting such data publicly. In the United States, virtually all students are in schools whose principals reported that achievement data are tracked over time by an administrative authority (the OECD average is 72%). In contrast only 7% of students in Japan attend such schools (OECD 2013d, Figure IV.4.13 and Table IV.4.31).

Quality assurance

Schools also use measures other than student assessments to monitor the quality of the education they provide. PISA 2012 asked school principals to report on whether their schools use various measures related to quality assurance and improvement. Analysis of these responses shows that systems that seek written feedback from students regarding lessons, teachers or resources tend to perform better. Across OECD countries, some 10% of the variation in the impact of students' socio-economic status on their mathematics performance can be accounted for by differences in the degree to which systems use this approach, after accounting for per capita GDP (OECD 2013d, Table IV.1.4). Among OECD countries, in the Netherlands, New Zealand and Turkey, over 85% of students attend schools whose principals reported that the school seeks written feedback from students. In the United States, some 59% of students attend such schools, a figure that is close to the OECD average (OECD 2013d, Figure IV.4.14 and Table IV.4.32).

On the other quality assurance measures that school principals were asked about, these all seem to be in relatively frequent use in the schools attended by 15-year-olds in the United States.

Across all countries and economies that participated in PISA 2012, but not across OECD countries on average, the extent to which schools provide opportunities for teacher mentoring is related to equity. In the systems where more schools provide teacher mentoring, students' socio-economic status has less impact on their performance, both before and after accounting for per capita GDP (OECD 2013d, Table IV.1.4).

RESOURCES

Effective school systems require the right combination of trained and talented personnel, adequate educational resources and facilities, and motivated students ready to learn. But performance on international comparisons cannot simply be tied to money, since only Luxembourg spends more per student than the United States. The results for the United States reflect a range of inefficiencies. That point is reinforced by the fact that the United States does relatively well by international standards in both the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS), which compare children in primary school. Given the country's wealth, that would be expected; the problem is that as they get older, children in the United States make less progress each year than children in the best-performing countries do. It is noteworthy that spending patterns in many of the world's successful education systems are markedly different from those in the United States. Successful systems such as Canada, Finland and Shanghai-China invest money where the challenges are greatest, rather than making the resources that are devoted to schools dependent on the wealth of the local communities in which schools are located; and they put in place incentives and support systems that attract the most talented school teachers into the most difficult classrooms. They have often reformed the traditional and bureaucratic systems they inherited for recruiting and training teachers and leaders, paying and rewarding them and shaping their incentives, both short term and long term.

Research usually shows a weak relationship between educational resources and student performance, with more variation explained by the quality of human resources (i.e. teachers and school principals) than by material and financial resources, particularly among industrialized nations. The generally weak relationship between resources and performance observed in past research is also seen in PISA.

Financial resources

A first glance at PISA results gives the impression that high-income countries and economies – and those that are able to and spend more on education – have better student performance. But, as noted in Box 2.1, higher expenditure on education is only predictive of higher PISA mathematics scores among countries and economies whose cumulative expenditure per student is below USD 50 000. This is not the case among high-income countries and economies, which include most OECD countries.

Thus, among these higher-income countries and economies, it is common to find some with substantially different levels of spending per student yet similar mathematics performance. For example, the United States and the Slovak Republic score 481 points in mathematics, but the United States' cumulative expenditure per student is more than double that of the Slovak Republic. Similarly, countries with similar levels of expenditure can perform very differently. For example, Italy and Singapore both have a cumulative expenditure per student of roughly USD 85 000, but while Italy scored 485 points in mathematics in PISA 2012, Singapore scored 573 points (OECD 2013d, Figure IV.1.8).

Moreover, analysis of PISA data shows that there is no relationship between increases in expenditure and changes in performance between 2003 and 2012.

A notable finding from PISA is that high-performing systems tend to prioritize higher salaries for teachers, especially in high-income countries (see OECD 2013d, Figure IV.1.10). Among countries whose per capita GDP is more than USD 20 000, including most OECD countries, systems that pay teachers more relative to national income tend to perform better in mathematics. The correlation between these two factors among 33 high-income countries is 0.30, and the correlation is 0.40 among 32 high-income countries excluding Qatar.[14] In contrast, among countries whose per capita GDP is under USD 20 000, a system's overall academic performance is unrelated to its teachers' salaries, suggesting that a host of other resources (material infrastructure, instructional materials, transportation, etc.) also need to be improved until they reach a certain threshold, after which improvements in material resources no longer benefit student performance, but improvements in human resources (through higher teachers' salaries, for example) do.[15]

Human resources

As with spending per student, the quantity of human resources tends to be unrelated to the academic performance or equity of school systems, after accounting for the level of national income.[16] Of course, a school system that lacks quality teachers, infrastructure and textbooks will almost certainly perform at lower levels than other systems. In fact, at the school level, teacher shortage appears to be related to poorer performance in most countries. In 33 countries and economies, including the United States, schools where a higher share of principals reported that teacher shortages hinder learning tend to show lower performance (OECD 2013d, Table IV.3.10). However, the degree of teacher shortage is related to the amount of other resources allocated to schools and to schools' socio-economic intake. The United States is one of a group of countries where advantaged and disadvantaged schools show particularly wide differences in the level of teacher shortages.

Material resources

The educational resources available in a school tend to be related to the system's overall performance as well as schools' average level of performance. Furthermore, it is shown that high-performing systems tend to allocate resources more equitably between socio-economically advantaged and disadvantaged schools.

After accounting for per capita GDP, 33% of the variation in mathematics performance across OECD countries can be explained by differences in principals' responses to questions about the adequacy of science laboratory equipment, instructional materials (e.g. textbooks), computers for instruction, Internet connectivity, computer software for instruction, and library materials (OECD 2013d, Table IV.1.2). In the schools attended by 15-year-olds in the United States, principals are relatively positive about the adequacy of educational resources in their schools, though they were least positive about the adequacy of computers used for instruction.

How resources are allocated to disadvantaged and advantaged schools is also related to systems' levels of performance. In higher-performing systems, principals in socio-economically advantaged and disadvantaged schools reported similar levels of quality of physical infrastructure and schools' educational resources, both across OECD countries and across all countries and economies that participated in PISA 2012 (OECD 2013d, Table IV.1.3). In the United States, the gap between the perceptions of principals in disadvantaged versus advantaged schools is large, with those from advantaged schools being far more positive. It is also important that, within school systems, much of the relationship between school resources and student performance is closely associated with schools' socio-economic and demographic profiles. This suggests the need for more consideration on how to distribute resources for schools more equitably.

Time resources

The average amount of time spent learning in regular mathematics lessons is positively related to student performance at the school level. Even after accounting for the socio-economic status and demographic profile of students and schools and various other school characteristics, in 15 countries and economies schools with more mathematics learning time tended to perform better in mathematics, though this is not the case in the United States (OECD 2013d, Table IV.1.12c). However, at the system level, across all OECD countries and all countries and economies that participated in PISA 2012, there is no clear pattern linking a system's overall mathematics performance and whether students in that system spend more time in regular mathematics classes or not (OECD 2013d, Table IV.1.2).[17] Since learning outcomes are the product of both the quantity and the quality of instruction time, this suggests that differences in the quality of instruction time between countries blur the relationship between the quantity of instruction time and student performance.

Schools whose students spend more hours on homework or other study set by teachers tend, on average, to perform better, even after accounting for the socio-economic status and demographic background of students and schools and various other school characteristics, and this is true in the United States (OECD 2013d, Tables IV.1.8b, IV.1.8c and IV.1.12b). This is not an obvious finding, since one might expect that lower-performing students spend more time doing homework. However, there may be other factors, such as higher-performing schools requiring more homework from their students. At the system level, the average number of hours that students spend on homework or other study tends to be unrelated to overall performance (OECD 2013d, Table IV.1.2).

Whether and for how long students are enrolled in pre-primary education is another important aspect of time resources invested in education. Many of the inequalities that exist within school systems are already present when students first enter formal schooling and persist as students progress.

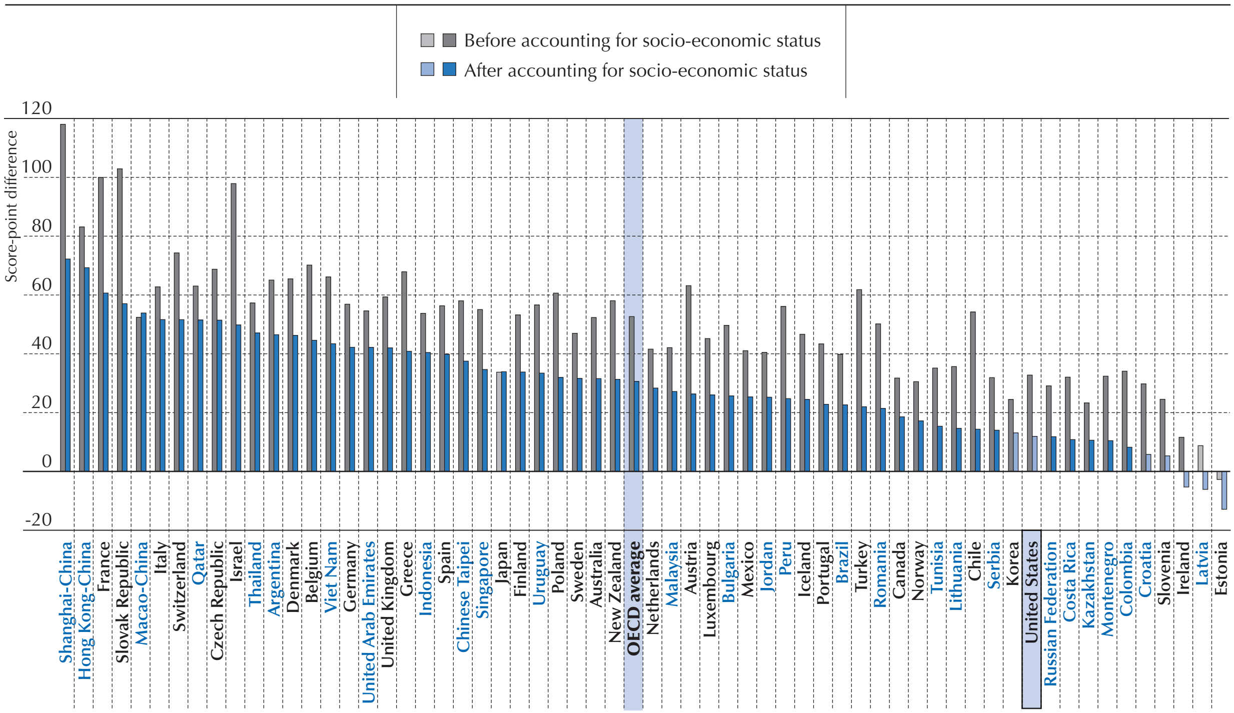
Students who had attended pre-primary education tend to perform better at the age of 15 than those who had not attended pre-primary education (Figure 2.11). In almost all countries, though not in the United States, this performance advantage remains even after accounting for socio-economic background. In general, across OECD countries, 74% of students reported that they had attended pre-primary education for more than one year – close to the figure for the United States – while in 24 participating countries and economies, over 80% of students reported that they had attended pre-primary education for more than one year (OECD 2013d, Table IV.3.33). The relationship between attendance at pre-primary education and performance is also apparent at the school level. In 19 countries and economies, schools with more students who had attended pre-primary education for more than one year tend to show better average performance, though this was not the case for the United States, (OECD 2013d, Table IV.1.12c). At the system level, across all countries and economies participating in PISA, there is also a relationship between the proportion of students who had attended pre-primary education for more than one year and overall performance in mathematics. Some 32% of the variation in mathematics performance across all countries and economies can be explained by the difference in the percentage of students who attended pre-primary education for more than one year, after accounting for per capita GDP (OECD 2013d, Table IV.1.2). However, across OECD countries, there is no clear relationship.

While these results underline the importance of pre-primary education, international comparisons of children in primary school show that the United States does well by international standards. However, as noted earlier, as they get older, these children make less progress each year than children in many other countries. In other words, more pre-primary education can only be part of the solution; quality of provision must also be ensured.

■ Figure 2.11 ■

Difference in mathematics performance, by attendance at pre-primary school

Between students who attended pre-primary school for more than one year and those who had not attended



Note: Score-point differences that are statistically significant are marked in a darker tone.
Countries and economies are ranked in descending order of the score-point difference in mathematics performance between students who reported that they had attended pre-primary school (ISCED 0) for more than one year and those who had not attended pre-primary school, after accounting for socio-economic status.
Source: OECD, PISA 2012 Database, Table II.4.12.

When the impact of pre-primary education attendance on reading performance at age 15 is compared between different socio-economic backgrounds, no significant difference is found between students from socio-economically disadvantaged and advantaged backgrounds (OECD 2013b, Table II.4.13). Students benefit equally from pre-primary education attendance whether they are socio-economically advantaged or disadvantaged in 29 OECD countries and 24 partner countries and economies.

The next chapter examines the performance of 15-year-old students in a finer level of detail by looking at the different items in the PISA test. This reveals relative strengths and weaknesses of students, with important messages for teaching in the United States.

■ Figure 2.12 ■

Comparing countries' and economies' performance in mathematics

Statistically significantly **above** the OECD average
Not statistically significantly different from the OECD average
Statistically significantly **below** the OECD average

Mean score	Comparison country/economy	Countries/economies whose mean score is NOT statistically significantly different from that comparison country's/economy's score
613	Shanghai-China	
573	Singapore	
561	Hong Kong-China	Chinese Taipei, Korea
560	Chinese Taipei	Hong Kong-China, Korea
554	Korea	Hong Kong-China, Chinese Taipei
538	Macao-China	Japan, Liechtenstein
536	Japan	Macao-China, Liechtenstein, Switzerland
535	Liechtenstein	Macao-China, Japan, Switzerland
531	Switzerland	Japan, Liechtenstein, Netherlands
523	Netherlands	Switzerland, Estonia, Finland, Canada, Poland, Viet Nam
521	Estonia	Netherlands, Finland, Canada, Poland, Viet Nam
519	Finland	Netherlands, Estonia, Canada, Poland, Belgium, Germany, Viet Nam
518	Canada	Netherlands, Estonia, Finland, Poland, Belgium, Germany, Viet Nam
518	Poland	Netherlands, Estonia, Finland, Canada, Belgium, Germany, Viet Nam
515	Belgium	Finland, Canada, Poland, Germany, Viet Nam
514	Germany	Finland, Canada, Poland, Belgium, Viet Nam
511	Viet Nam	Netherlands, Estonia, Finland, Canada, Poland, Belgium, Germany, Austria, Australia, Ireland
506	Austria	Viet Nam, Australia, Ireland, Slovenia, Denmark, New Zealand, Czech Republic
504	Australia	Viet Nam, Austria, Ireland, Slovenia, Denmark, New Zealand, Czech Republic
501	Ireland	Viet Nam, Austria, Australia, Slovenia, Denmark, New Zealand, Czech Republic, France, United Kingdom
501	Slovenia	Austria, Australia, Ireland, Denmark, New Zealand, Czech Republic
500	Denmark	Austria, Australia, Ireland, Slovenia, New Zealand, Czech Republic, France, United Kingdom
500	New Zealand	Austria, Australia, Ireland, Slovenia, Denmark, Czech Republic, France, United Kingdom
499	Czech Republic	Austria, Australia, Ireland, Slovenia, Denmark, New Zealand, France, United Kingdom, Iceland
495	France	Ireland, Denmark, New Zealand, Czech Republic, United Kingdom, Iceland, Latvia, Luxembourg, Norway, Portugal
494	United Kingdom	Ireland, Denmark, New Zealand, Czech Republic, France, Iceland, Latvia, Luxembourg, Norway, Portugal
493	Iceland	Czech Republic, France, United Kingdom, Latvia, Luxembourg, Norway, Portugal
491	Latvia	France, United Kingdom, Iceland, Luxembourg, Norway, Portugal, Italy, Spain
490	Luxembourg	France, United Kingdom, Iceland, Latvia, Norway, Portugal
489	Norway	France, United Kingdom, Iceland, Latvia, Luxembourg, Portugal, Italy, Spain, Russian Federation, Slovak Republic, United States
487	Portugal	France, United Kingdom, Iceland, Latvia, Luxembourg, Norway, Italy, Spain, Russian Federation, Slovak Republic, United States, Lithuania
485	Italy	Latvia, Norway, Portugal, Spain, Russian Federation, Slovak Republic, United States, Lithuania
484	Spain	Latvia, Norway, Portugal, Italy, Russian Federation, Slovak Republic, United States, Lithuania, Hungary
482	Russian Federation	Norway, Portugal, Italy, Spain, Slovak Republic, United States, Lithuania, Sweden, Hungary
482	Slovak Republic	Norway, Portugal, Italy, Spain, Russian Federation, United States, Lithuania, Sweden, Hungary
481	**United States**	Norway, Portugal, Italy, Spain, Russian Federation, Slovak Republic, Lithuania, Sweden, Hungary
479	Lithuania	Portugal, Italy, Spain, Russian Federation, Slovak Republic, United States, Sweden, Hungary, Croatia
478	Sweden	Russian Federation, Slovak Republic, United States, Lithuania, Hungary, Croatia
477	Hungary	Spain, Russian Federation, Slovak Republic, United States, Lithuania, Sweden, Croatia, Israel
471	Croatia	Lithuania, Sweden, Hungary, Israel
466	Israel	Hungary, Croatia
453	Greece	Serbia, Turkey, Romania
449	Serbia	Greece, Turkey, Romania, Bulgaria
448	Turkey	Greece, Serbia, Romania, Cyprus[1, 2], Bulgaria
445	Romania	Greece, Serbia, Turkey, Cyprus[1, 2], Bulgaria
440	Cyprus[1, 2]	Turkey, Romania, Bulgaria
439	Bulgaria	Serbia, Turkey, Romania, Cyprus[1, 2], United Arab Emirates, Kazakhstan
434	United Arab Emirates	Bulgaria, Kazakhstan, Thailand
432	Kazakhstan	Bulgaria, United Arab Emirates, Thailand
427	Thailand	United Arab Emirates, Kazakhstan, Chile, Malaysia
423	Chile	Thailand, Malaysia
421	Malaysia	Thailand, Chile
413	Mexico	Uruguay, Costa Rica
410	Montenegro	Uruguay, Costa Rica
409	Uruguay	Mexico, Montenegro, Costa Rica
407	Costa Rica	Mexico, Montenegro, Uruguay
394	Albania	Brazil, Argentina, Tunisia
391	Brazil	Albania, Argentina, Tunisia, Jordan
388	Argentina	Albania, Brazil, Tunisia, Jordan
388	Tunisia	Albania, Brazil, Argentina, Jordan
386	Jordan	Brazil, Argentina, Tunisia
376	Colombia	Qatar, Indonesia, Peru
376	Qatar	Colombia, Indonesia
375	Indonesia	Colombia, Qatar, Peru
368	Peru	Colombia, Indonesia

1. Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
2. Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.
Source: OECD, PISA 2012 Database.

■ Figure 2.13 ■

Comparing countries' and economies' performance in reading

- Statistically significantly **above** the OECD average
- Not statistically significantly different from the OECD average
- Statistically significantly **below** the OECD average

Mean score	Comparison country/economy	Countries/economies whose mean score is NOT statistically significantly different from that comparison country's/economy's score
570	Shanghai-China	
545	Hong Kong-China	Singapore, Japan, Korea
542	Singapore	Hong Kong-China, Japan, Korea
538	Japan	Hong Kong-China, Singapore, Korea
536	Korea	Hong Kong-China, Singapore, Japan
524	Finland	Ireland, Chinese Taipei, Canada, Poland, Liechtenstein
523	Ireland	Finland, Chinese Taipei, Canada, Poland, Liechtenstein
523	Chinese Taipei	Finland, Ireland, Canada, Poland, Estonia, Liechtenstein
523	Canada	Finland, Ireland, Chinese Taipei, Poland, Liechtenstein
518	Poland	Finland, Ireland, Chinese Taipei, Canada, Estonia, Liechtenstein, New Zealand, Australia, Netherlands, Viet Nam
516	Estonia	Chinese Taipei, Poland, Liechtenstein, New Zealand, Australia, Netherlands, Viet Nam
516	Liechtenstein	Finland, Ireland, Chinese Taipei, Canada, Poland, Estonia, New Zealand, Australia, Netherlands, Belgium, Switzerland, Macao-China, Viet Nam, Germany
512	New Zealand	Poland, Estonia, Liechtenstein, Australia, Netherlands, Belgium, Switzerland, Macao-China, Viet Nam, Germany, France
512	Australia	Poland, Estonia, Liechtenstein, New Zealand, Netherlands, Belgium, Switzerland, Macao-China, Viet Nam, Germany, France
511	Netherlands	Poland, Estonia, Liechtenstein, New Zealand, Australia, Belgium, Switzerland, Macao-China, Viet Nam, Germany, France, Norway
509	Belgium	Liechtenstein, New Zealand, Australia, Netherlands, Switzerland, Macao-China, Viet Nam, Germany, France, Norway
509	Switzerland	Liechtenstein, New Zealand, Australia, Netherlands, Belgium, Macao-China, Viet Nam, Germany, France, Norway
509	Macao-China	Liechtenstein, New Zealand, Australia, Netherlands, Belgium, Switzerland, Viet Nam, Germany, France, Norway
508	Viet Nam	Poland, Estonia, Liechtenstein, New Zealand, Australia, Netherlands, Belgium, Switzerland, Macao-China, Germany, France, Norway, United Kingdom, United States
508	Germany	Liechtenstein, New Zealand, Australia, Netherlands, Belgium, Switzerland, Macao-China, Viet Nam, France, Norway, United Kingdom
505	France	New Zealand, Australia, Netherlands, Belgium, Switzerland, Macao-China, Viet Nam, Germany, Norway, United Kingdom, United States
504	Norway	Netherlands, Belgium, Switzerland, Macao-China, Viet Nam, Germany, France, United Kingdom, United States, Denmark
499	United Kingdom	Viet Nam, Germany, France, Norway, United States, Denmark, Czech Republic
498	**United States**	Viet Nam, France, Norway, United Kingdom, Denmark, Czech Republic, Italy, Austria, Hungary, Portugal, Israel
496	Denmark	Norway, United Kingdom, United States, Czech Republic, Italy, Austria, Hungary, Portugal, Israel
493	Czech Republic	United Kingdom, United States, Denmark, Italy, Austria, Latvia, Hungary, Spain, Luxembourg, Portugal, Israel, Croatia
490	Italy	United States, Denmark, Czech Republic, Austria, Latvia, Hungary, Spain, Luxembourg, Portugal, Israel, Croatia, Sweden
490	Austria	United States, Denmark, Czech Republic, Italy, Latvia, Hungary, Spain, Luxembourg, Portugal, Israel, Croatia, Sweden
489	Latvia	Czech Republic, Italy, Austria, Hungary, Spain, Luxembourg, Portugal, Israel, Croatia, Sweden
488	Hungary	United States, Denmark, Czech Republic, Italy, Austria, Latvia, Spain, Luxembourg, Portugal, Israel, Croatia, Sweden, Iceland
488	Spain	Czech Republic, Italy, Austria, Latvia, Hungary, Luxembourg, Portugal, Israel, Croatia, Sweden
488	Luxembourg	Czech Republic, Italy, Austria, Latvia, Hungary, Spain, Portugal, Israel, Croatia, Sweden
488	Portugal	United States, Denmark, Czech Republic, Italy, Austria, Latvia, Hungary, Spain, Luxembourg, Israel, Croatia, Sweden, Iceland, Slovenia
486	Israel	United States, Denmark, Czech Republic, Italy, Austria, Latvia, Hungary, Spain, Luxembourg, Portugal, Croatia, Sweden, Iceland, Slovenia, Lithuania, Greece, Turkey, Russian Federation
485	Croatia	Czech Republic, Italy, Austria, Latvia, Hungary, Spain, Luxembourg, Portugal, Israel, Sweden, Iceland, Slovenia, Lithuania, Greece, Turkey
483	Sweden	Italy, Austria, Latvia, Hungary, Spain, Luxembourg, Portugal, Israel, Croatia, Iceland, Slovenia, Lithuania, Greece, Turkey, Russian Federation
483	Iceland	Hungary, Portugal, Israel, Croatia, Sweden, Slovenia, Lithuania, Greece, Turkey
481	Slovenia	Portugal, Israel, Croatia, Sweden, Iceland, Lithuania, Greece, Turkey, Russian Federation
477	Lithuania	Israel, Croatia, Sweden, Iceland, Slovenia, Greece, Turkey, Russian Federation
477	Greece	Israel, Croatia, Sweden, Iceland, Slovenia, Lithuania, Turkey, Russian Federation
475	Turkey	Israel, Croatia, Sweden, Iceland, Slovenia, Lithuania, Greece, Russian Federation
475	Russian Federation	Israel, Sweden, Slovenia, Lithuania, Greece, Turkey
463	Slovak Republic	
449	Cyprus[1, 2]	Serbia
446	Serbia	Cyprus[1, 2], United Arab Emirates, Chile, Thailand, Costa Rica, Romania, Bulgaria
442	United Arab Emirates	Serbia, Chile, Thailand, Costa Rica, Romania, Bulgaria
441	Chile	Serbia, United Arab Emirates, Thailand, Costa Rica, Romania, Bulgaria
441	Thailand	Serbia, United Arab Emirates, Chile, Costa Rica, Romania, Bulgaria
441	Costa Rica	Serbia, United Arab Emirates, Chile, Thailand, Romania, Bulgaria
438	Romania	Serbia, United Arab Emirates, Chile, Thailand, Costa Rica, Bulgaria
436	Bulgaria	Serbia, United Arab Emirates, Chile, Thailand, Costa Rica, Romania
424	Mexico	Montenegro
422	Montenegro	Mexico
411	Uruguay	Brazil, Tunisia, Colombia
410	Brazil	Uruguay, Tunisia, Colombia
404	Tunisia	Uruguay, Brazil, Colombia, Jordan, Malaysia, Indonesia, Argentina, Albania
403	Colombia	Uruguay, Brazil, Tunisia, Jordan, Malaysia, Indonesia, Argentina
399	Jordan	Tunisia, Colombia, Malaysia, Indonesia, Argentina, Albania, Kazakhstan
398	Malaysia	Tunisia, Colombia, Jordan, Indonesia, Argentina, Albania, Kazakhstan
396	Indonesia	Tunisia, Colombia, Jordan, Malaysia, Argentina, Albania, Kazakhstan
396	Argentina	Tunisia, Colombia, Jordan, Malaysia, Indonesia, Albania, Kazakhstan
394	Albania	Tunisia, Jordan, Malaysia, Indonesia, Argentina, Kazakhstan, Qatar, Peru
393	Kazakhstan	Jordan, Malaysia, Indonesia, Argentina, Albania, Qatar, Peru
388	Qatar	Albania, Kazakhstan, Peru
384	Peru	Albania, Kazakhstan, Qatar

1. Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
2. Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.
Source: OECD, PISA 2012 Database.

■ Figure 2.14 ■

Comparing countries' and economies' performance in science

Statistically significantly **above** the OECD average
Not statistically significantly different from the OECD average
Statistically significantly **below** the OECD average

Mean score	Comparison country/economy	Countries/economies whose mean score is NOT statistically significantly different from that comparison country's/economy's score
580	Shanghai-China	
555	Hong Kong-China	Singapore, Japan
551	Singapore	Hong Kong-China, Japan
547	Japan	Hong Kong-China, Singapore, Finland, Estonia, Korea
545	Finland	Japan, Estonia, Korea
541	Estonia	Japan, Finland, Korea
538	Korea	Japan, Finland, Estonia, Viet Nam
528	Viet Nam	Korea, Poland, Canada, Liechtenstein, Germany, Chinese Taipei, Netherlands, Ireland, Australia, Macao-China
526	Poland	Viet Nam, Canada, Liechtenstein, Germany, Chinese Taipei, Netherlands, Ireland, Australia, Macao-China
525	Canada	Viet Nam, Poland, Liechtenstein, Germany, Chinese Taipei, Netherlands, Ireland, Australia
525	Liechtenstein	Viet Nam, Poland, Canada, Germany, Chinese Taipei, Netherlands, Ireland, Australia, Macao-China
524	Germany	Viet Nam, Poland, Canada, Liechtenstein, Chinese Taipei, Netherlands, Ireland, Australia, Macao-China
523	Chinese Taipei	Viet Nam, Poland, Canada, Liechtenstein, Germany, Netherlands, Ireland, Australia, Macao-China
522	Netherlands	Viet Nam, Poland, Canada, Liechtenstein, Germany, Chinese Taipei, Ireland, Australia, Macao-China, New Zealand, Switzerland, United Kingdom
522	Ireland	Viet Nam, Poland, Canada, Liechtenstein, Germany, Chinese Taipei, Netherlands, Australia, Macao-China, New Zealand, Switzerland, United Kingdom
521	Australia	Viet Nam, Poland, Canada, Liechtenstein, Germany, Chinese Taipei, Netherlands, Ireland, Macao-China, Switzerland, United Kingdom
521	Macao-China	Viet Nam, Poland, Liechtenstein, Germany, Chinese Taipei, Netherlands, Ireland, Australia, Switzerland, United Kingdom
516	New Zealand	Netherlands, Ireland, Switzerland, Slovenia, United Kingdom
515	Switzerland	Netherlands, Ireland, Australia, Macao-China, New Zealand, Slovenia, United Kingdom, Czech Republic
514	Slovenia	New Zealand, Switzerland, United Kingdom, Czech Republic
514	United Kingdom	Netherlands, Ireland, Australia, Macao-China, New Zealand, Switzerland, Slovenia, Czech Republic, Austria
508	Czech Republic	Switzerland, Slovenia, United Kingdom, Austria, Belgium, Latvia
506	Austria	United Kingdom, Czech Republic, Belgium, Latvia, France, Denmark, United States
505	Belgium	Czech Republic, Austria, Latvia, France, United States
502	Latvia	Czech Republic, Austria, Belgium, France, Denmark, United States, Spain, Lithuania, Norway, Hungary
499	France	Austria, Belgium, Latvia, Denmark, United States, Spain, Lithuania, Norway, Hungary, Italy, Croatia
498	Denmark	Austria, Latvia, France, United States, Spain, Lithuania, Norway, Hungary, Italy, Croatia
497	**United States**	Austria, Belgium, Latvia, France, Denmark, Spain, Lithuania, Norway, Hungary, Italy, Croatia, Luxembourg, Portugal
496	Spain	Latvia, France, Denmark, United States, Lithuania, Norway, Hungary, Italy, Croatia, Portugal
496	Lithuania	Latvia, France, Denmark, United States, Spain, Norway, Hungary, Italy, Croatia, Luxembourg, Portugal
495	Norway	Latvia, France, Denmark, United States, Spain, Lithuania, Hungary, Italy, Croatia, Luxembourg, Portugal, Russian Federation
494	Hungary	Latvia, France, Denmark, United States, Spain, Lithuania, Norway, Italy, Croatia, Luxembourg, Portugal, Russian Federation
494	Italy	France, Denmark, United States, Spain, Lithuania, Norway, Hungary, Croatia, Luxembourg, Portugal
491	Croatia	France, Denmark, United States, Spain, Lithuania, Norway, Hungary, Italy, Luxembourg, Portugal, Russian Federation, Sweden
491	Luxembourg	United States, Lithuania, Norway, Hungary, Italy, Croatia, Portugal, Russian Federation
489	Portugal	United States, Spain, Lithuania, Norway, Hungary, Italy, Croatia, Luxembourg, Russian Federation, Sweden
486	Russian Federation	Norway, Hungary, Croatia, Luxembourg, Portugal, Sweden
485	Sweden	Croatia, Portugal, Russian Federation Iceland
478	Iceland	Sweden, Slovak Republic, Israel
471	Slovak Republic	Iceland, Israel, Greece, Turkey
470	Israel	Iceland, Slovak Republic, Greece, Turkey
467	Greece	Slovak Republic, Israel, Turkey
463	Turkey	Slovak Republic, Israel, Greece
448	United Arab Emirates	Bulgaria, Chile, Serbia, Thailand
446	Bulgaria	United Arab Emirates, Chile, Serbia, Thailand, Romania, Cyprus[1, 2]
445	Chile	United Arab Emirates, Bulgaria, Serbia, Thailand, Romania
445	Serbia	United Arab Emirates, Bulgaria, Chile, Thailand, Romania
444	Thailand	United Arab Emirates, Bulgaria, Chile, Serbia, Romania
439	Romania	Bulgaria, Chile, Serbia, Thailand, Cyprus[1, 2]
438	Cyprus[1, 2]	Bulgaria, Romania
429	Costa Rica	Kazakhstan
425	Kazakhstan	Costa Rica, Malaysia
420	Malaysia	Kazakhstan, Uruguay, Mexico
416	Uruguay	Malaysia, Mexico, Montenegro, Jordan
415	Mexico	Malaysia, Uruguay, Jordan
410	Montenegro	Uruguay, Jordan, Argentina
409	Jordan	Uruguay, Mexico, Montenegro, Argentina, Brazil
406	Argentina	Montenegro, Jordan, Brazil, Colombia, Tunisia, Albania
405	Brazil	Jordan, Argentina, Colombia, Tunisia
399	Colombia	Argentina, Brazil, Tunisia, Albania
398	Tunisia	Argentina, Brazil, Colombia, Albania
397	Albania	Argentina, Colombia, Tunisia
384	Qatar	Indonesia
382	Indonesia	Qatar, Peru
373	Peru	Indonesia

1. Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
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Source: OECD, PISA 2012 Database.

Notes

1. Though rank 26 is the best estimate, due to sampling and measurement error the rank could be between 23 and 29.

2. Though rank 17 is the best estimate, due to sampling and measurement error the rank could be between 14 and 20.

3. Though rank 21 is the best estimate, due to sampling and measurement error the rank could be between 17 and 25.

4. A socio-economically disadvantaged school is one whose students' mean socio-economic status is statistically significantly below the mean socio-economic status of the country. See Table II.2.11 of OECD, 2013b.

5. All figures shown in purchasing power parities.

6. This is measured by the *PISA index of economic, social and cultural status* of students. The index has an average of 0 and a standard deviation of 1 for OECD countries. The index value for the most disadvantaged quarter of students is -1.14 for the United States and -1.15 for the OECD average. The index value for the entire student population is 0.17 for the United States and 0.00 for the OECD average.

7. No such data are available for the United States.

8. Resilient students are those who come from a socio-economically disadvantaged background and perform much higher than would be predicted by their background. To identify these students, first the relationship between performance and socio-economic background across all students participating in the PISA 2012 assessment is established. Then the actual performance of each disadvantaged student is compared with the performance predicted by the average relationship among students from similar socio-economic backgrounds across countries. This difference is defined as the student's residual performance. A disadvantaged student is classified as resilient if his or her residual performance is found to be among the top quarter of students' residual performance from all countries.

9. Across OECD countries, the correlation between the degree of competition and equity is 0.33 (significant at the 10% level), while it is 0.23 after excluding Norway, where there is less school competition than in other countries (i.e. the degree of school competition is 35% in Norway, while it varies from 42% to 94% in other OECD countries).

10. The percentage is obtained by squaring the partial correlation coefficient and then multiplying it by 100.

11. Partial correlation coefficients are -0.36 among all participating countries and economies (significant at the 5% level).

12. Information is available for all OECD countries except Canada, New Zealand and Slovenia. Information is available for all participating partner countries and economies except Argentina, Costa Rica, Kazakhstan and Serbia. Switzerland and Turkey do not have information on the existence of assessments so they are excluded from the analysis.

13. These groups are created using a cluster analysis with the Ward method, which groups countries and economies to minimize the variance within each cluster, using data available in Table IV.3.4 in OECD, 2013d. Variables that entered the analyses are: the existence of national assessments in lower secondary and upper secondary schools, the percentage of students taking national examinations in lower and upper secondary general programs, the percentage of students taking other examinations in lower and upper secondary general programs, and the percentage of tertiary fields of study requiring a non-secondary school examination for access. For those countries and economies where the percentage of students taking the examinations is unavailable, if examinations are compulsory, a percentage of 100 is used (Viet Nam), and if not compulsory, a percentage of 50 is used (Australia, upper secondary education). When the percentage of students taking other examinations is missing, a percentage value of 0 is used if no information on other examinations is provided (Australia, Slovenia, Korea, Turkey, Romania, Tunisia and Viet Nam); if these examinations do exist, then a value of 50 is used (Japan). When the number of fields of study requiring a tertiary examination is missing, a value of 0 is used (Tunisia).

14. Among OECD countries, the correlation is 0.32.

15. The correlation is -0.22 among 17 countries and economies whose per capita GDP is less than USD 20 000.

16. Statistically significant coefficients in Table IV.1.2 in OECD, 2013d are mainly the result of outliers. For example, the correlation between the student-teacher ratio and performance is -0.48 across OECD countries, but it is 0.09 after excluding two countries with extreme student-teacher ratios (31 in Mexico and 22 in Chile, while the average ranges from 8 to 18 in other OECD countries).

17. Across OECD countries, the correlation between mathematics performance and average learning time in regular mathematics lessons is -0.30 (significant at the 10% level), but this is mainly because of outliers.

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