



Reader's guide

Data underlying the figures

The data referred to in this volume are presented in Annex B and, in greater detail, including some additional tables, on the PISA website (www.pisa.oecd.org).

Four symbols are used to denote missing data:

- c There are too few observations or no observation to provide reliable estimates (i.e. there are fewer than 30 students or fewer than 5 schools with valid data).
- m Data are not available. These data were not submitted by the country or were collected but subsequently removed from the publication for technical reasons.
- w Data have been withdrawn or have not been collected at the request of the country concerned.
- n The response rate is too low to provide reliable estimates. See Annex A1 for further information.

Country coverage

This publication features data on 10 OECD countries and economies (Australia, the Flemish Community of Belgium, seven provinces in Canada, Chile, Italy, the Netherlands, Poland, the Slovak Republic, Spain and the United States) and 5 partner countries and economies (Brazil, Beijing-Shanghai-Jiangsu-Guangdong [China], Lithuania, Peru and the Russian Federation).

Canadian provinces refer to the seven provinces in Canada that participated in the PISA financial literacy assessment: British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario and Prince Edward Island.

B-S-J-G (China) refers to the four PISA-participating China provinces: Beijing, Shanghai, Jiangsu and Guangdong.

International averages

The OECD average corresponds to the arithmetic mean of the respective country estimates. It was calculated for most indicators presented in this report.

In analyses involving data from multiple years, the OECD average is reported on consistent sets of OECD countries, and several averages may be reported in the same table.

A number in the label used in figures and tables indicates the number of countries included in the average:

OECD average-10: Arithmetic mean across all the ten OECD countries and economies (Australia, the Flemish Community of Belgium, the Canadian provinces, Chile, Italy, the Netherlands, Poland, the Slovak Republic, Spain and the United States) that participated in the 2015 PISA financial literacy assessment.

OECD average-7: Arithmetic mean across the seven OECD countries and economies (Australia, the Flemish Community of Belgium, Italy, Poland, the Slovak Republic, Spain and the United States) that participated in both the 2012 and 2015 financial literacy assessments. The OECD average-7 is used in trend analyses in Chapters 3, 4 and 5.

Rounding figures

Because of rounding, some figures in tables may not add up exactly to the totals. Totals, differences and averages are always calculated on the basis of exact numbers and are rounded only after calculation.

All standard errors in this publication have been rounded to one or two decimal places. Where the value 0.0 or 0.00 is shown, this does not imply that the standard error is zero, but that it is smaller than 0.05 or 0.005, respectively.



Reporting student data

The report uses “15-year-olds” as shorthand for the PISA target population. PISA covers students who are aged between 15 years 3 months and 16 years 2 months at the time of assessment and who are enrolled in school and have completed at least 6 years of formal schooling, regardless of the type of institution in which they are enrolled, and whether they are in full-time or part-time education, whether they attend academic or vocational programmes, and whether they attend public or private schools or foreign schools within the country.

Reporting school data

The principals of the schools in which students were assessed provided information on their schools’ characteristics by completing a school questionnaire. Where responses from school principals are presented in this publication, they are weighted so that they are proportionate to the number of 15-year-olds enrolled in the school.

Focusing on statistically significant differences

This volume discusses only statistically significant differences or changes. These are denoted in darker colours in figures and in bold font in tables. See Annex A3 for further information.

Changes in the PISA methodology

Several changes were made to the PISA methodology in 2015:

- **Change in assessment mode** from paper-based to computer. Over the past 20 years, digital technologies have fundamentally transformed the ways in which we read and manage information. To better reflect how students and societies access, use and communicate information, starting with the 2015 round, the assessment was delivered mainly on computers, although countries had the option to use a paper-based version. For more information, see Annex A5.
- **Changes in scaling procedures** include:
 - Change from a one-parameter model to a hybrid model that applies both a one- and two-parameter model, as appropriate. The one-parameter (Rasch) model is retained for all items where the model is statistically appropriate; a more general 2-parameter model is used instead if the fit of the one-parameter model could not be established. This approach improves the fit of the model to the observed student responses and reduces model and measurement errors.
 - Change in treatment of non-reached items to ensure that the treatment is consistent between the estimation of item parameters and the estimation of the population model to generate proficiency estimates in the form of plausible values. Implementing this consistency avoids the introduction of systematic errors that result in the generation of plausible values otherwise.
 - Change from cycle-specific scaling to multiple-cycle scaling in order to combine data, and retain and aggregate information about trend items used in previous cycles. This change results in consistent item parameters across cycles, which strengthen and support the inferences made about proficiencies on each scale.
 - Change from including only a subsample for item calibration to including the total sample with weights, in order to fully use the available data and reduce the error in item-parameter estimates by increasing the sample size. This eliminates the variability of item-parameter estimation that is due to the random selection of small calibration samples.
 - Change from assigning internationally fixed item parameters and dropping a few dodgy items per country, to assigning a few nationally unique item parameters for those items that show significant deviation from the international parameters. This retains a maximum set of internationally equivalent items without dropping data and, as a result, reduces overall measurement errors.

The overall impact of these changes on trend comparisons is quantified by the link errors. As in previous cycles, a major part of the linking error is due to re-estimated item parameters. While these have been the same from the 2000 through the 2015 rounds, link errors will be reduced in future assessment rounds. For more information on the calculation of this quantity and how to use it in analyses, see Annex A5 and the *PISA 2015 Technical Report* (OECD, forthcoming).



- **Changes in population coverage and response rates.** Even though PISA has consistently used the same standardised methods to collect comparable and representative samples, and population coverage and response rates were carefully reviewed during the adjudication process, slight changes in population coverage and response rates can affect point estimates of proficiency. The uncertainty around the point estimates due to sampling is quantified in sampling errors, which are the major part of standard errors reported for country mean estimates. For more information, see Annexes A2 and A4.
- **Changes in test administration.** As in PISA 2000 (but different from other cycles up to 2012), students who sat the mathematics, reading and science tests in 2015 had to take their break before starting to work on test clusters 3 and 4, and could not work for more than one hour on clusters 1 and 2. This reduces cluster-position effects. This change does not affect the financial literacy assessment, as it includes only two clusters.
- **Scheduling of the financial literacy assessment.** This change was specific to financial literacy and did not affect the assessments in the other domains. Sampling design and the scheduling of test administration changed between the 2012 and 2015 assessments. Students assessed in financial literacy in 2015 sat the test after having been tested in mathematics, reading and science, while students assessed in financial literacy in 2012 were tested in financial literacy – as well as in mathematics and reading – at the same time as other students were taking the core assessment.

In sum, changes to the assessment design and the mode of delivery were carefully examined in order to ensure that the 2015 results can be presented as trend measures at the international level. The data show no consistent association between students' familiarity with ICT and with performance shifts between 2012 and 2015 across countries. Changes in scaling procedures are part of the link error, as they were in the past, where the link error quantified the changes introduced by re-estimating item parameters on a subset of countries and students who participated in each cycle. Changes due to sampling variability are quantified in the sampling error. Changes in test design and administration are not fully reflected in estimates of the uncertainty of trend comparisons. These changes are a common feature of past PISA rounds as well, and are most likely of secondary importance when analysing trends. The scheduling change in the financial literacy assessment, however, means that genuine financial literacy trends may be confounded with changes in the scheduling of the assessment.

The factors below are examples of potential effects that are relevant for the changes seen from one PISA round to the next. While these can be quantified and related to, for example, census data if available, these are outside of the control of the assessment programme:

- **Change in coverage of PISA target population.** PISA's target population is 15-year-old students enrolled in grade 7 or above. Some education systems saw a rapid expansion of 15-year-olds' access to school because of a reduction in dropout rates or in grade repetition. This is explained in detail, and countries' performance adjusted for this change is presented in Volume I.
- **Change in demographic characteristics.** In some countries, there might be changes in the composition of the population of 15-year-old students. For example, there might be more students with an immigrant background. Chapters 3 and 4 in this volume present performance (country mean and distribution) adjusted for changes in the composition of the student population, including students' immigrant background, gender and age.
- **Change in student competency.** The average proficiency of 15-year-old students in 2015 might be higher or lower than that in 2012 or earlier rounds.

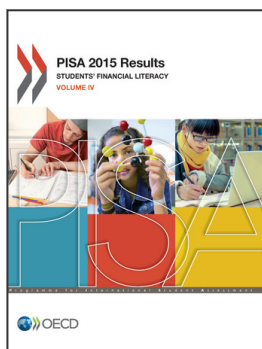
Abbreviations used in this report

ESCS	PISA index of economic, social and cultural status	PPP	Purchasing power parity
GDP	Gross domestic product	S.D.	Standard deviation
ISCED	International Standard Classification of Education	S.E.	Standard error
ISCO	International Standard Classification of Occupations	Score dif.	Score-point difference
% dif.	Percentage-point difference		

**Further documentation**

For further information on the PISA assessment instruments and the methods used in PISA, see the *PISA 2015 Technical Report* (OECD, forthcoming).

This report uses the OECD StatLinks service. Below each table and chart is a URL leading to a corresponding ExcelTM workbook containing the underlying data. These URLs are stable and will remain unchanged over time. In addition, readers of the e-books will be able to click directly on these links and the workbook will open in a separate window, if their internet browser is open and running.



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