Annex A

TECHNICAL BACKGROUND

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ANNEX A1

CONSTRUCTION OF READING SCALES AND INDICES FROM THE STUDENT CONTEXT QUESTIONNAIRES

How the PISA 2009 reading assessments were designed, analysed and scaled

The development of the PISA 2009 reading tasks was co-ordinated by an international consortium of educational research institutions contracted by the OECD, under the guidance of a group of reading experts from participating countries. Participating countries contributed stimulus material and questions, which were reviewed, tried out and refined iteratively over the three years leading up to the administration of the assessment in 2009. The development process involved provisions for several rounds of commentary from participating countries, as well as small-scale piloting and a formal field trial in which samples of 15-year-olds from all participating countries took part. The reading expert group recommended the final selection of tasks, which included material submitted by 21 of the participating countries. The selection was made with regard to both their technical quality, assessed on the basis of their performance in the field trial, and their cultural appropriateness and interest level for 15-year-olds, as judged by the participating countries. Another essential criterion for selecting the set of material as a whole was its fit to the framework described in *Volume 1, What Students Know and Can Do*, to maintain the balance across various categories of text, aspect and situation. Finally, it was carefully ensured that the set of questions covered a range of difficulty, allowing good measurement and description of the reading literacy of all 15-year-old students, from the least proficient to the highly able.

More than 130 print reading questions were used in PISA 2009, but each student in the sample only saw a fraction of the total pool because different sets of questions were given to different students. The reading questions selected for inclusion in PISA 2009 were organised into half-hour clusters. These, along with clusters of mathematics and science questions, were assembled into booklets containing four clusters each. Each participating student was then given a two-hour assessment. As reading was the focus of the PISA 2009 assessment, every booklet included at least one cluster of reading material. The clusters were rotated so that each cluster appeared in each of the four possible positions in the booklets, and each pair of clusters appeared in at least one of the 13 booklets that were used.

This design, similar to those used in previous PISA assessments, makes it possible to construct a single scale of reading proficiency, in which each question is associated with a particular point on the scale that indicates its difficulty, whereby each student's performance is associated with a particular point on the same scale that indicates his or her estimated proficiency. A description of the modelling technique used to construct this scale can be found in the *PISA 2009 Technical Report* (OECD, forthcoming).

The relative difficulty of tasks in a test is estimated by considering the proportion of test takers who answer each question correctly. The relative proficiency of students taking a particular test can be estimated by considering the proportion of test questions they answer correctly. A single continuous scale shows the relationship between the difficulty of questions and the proficiency of students. By constructing a scale that shows the difficulty of each question, it is possible to locate the level of reading literacy that the question represents. By showing the proficiency of each student on the same scale, it is possible to describe the level of reading literacy that the student possesses.

The location of student proficiency on this scale is set in relation to the particular group of questions used in the assessment. However, just as the sample of students taking PISA in 2009 is drawn to represent all the 15-year-olds in the participating countries, so the individual questions used in the assessment are designed to represent the definition of reading literacy adequately. Estimates of student proficiency reflect the kinds of tasks they would be expected to perform successfully. This means that students are likely to be able to complete questions successfully at or below the difficulty level associated with their own position on the scale (but they may not always do so). Conversely, they are unlikely to be able to successfully complete questions above the difficulty level associated with their position on the scale (but they may sometimes do so).

The further a student's proficiency is located above a given question, the more likely he or she is to successfully complete the question (and other questions of similar difficulty); the further the student's proficiency is located below a given question, the lower the probability that the student will be able to successfully complete the question, and other questions of similar difficulty.

How the PISA 2009 reading scales were aligned with PISA 2000, 2003 and 2006 reading scales

The reading performance scale used in the 2000, 2003, 2006 and 2009 assessments is the same, which means that score points on this scale are directly comparable over time. This is due to the use of link items that are common across assessments and can be used in the equating procedure to align performance scales.

A two-step equating approach was used to report PISA 2009 reading results on the PISA 2000 reading scale. In the first step, a shift to align items was computed. Although 28 out of the 101 items were link items that had been used in each previous PISA

assessment, only 26 link items were finally considered since the performance of two of the items was deemed unsatisfactory for linking purposes. The average item difficulty of the 26 link items was computed for 2009 and 2006 assessments and the difference was then applied to shift 2009 performance to align with the 2006 scale. The 2006 reading performance scale was already aligned to 2003, and 2003 was previously aligned to 2000, meaning that the 2009 performance scale was thus aligned with the one constructed for the first time in 2000.

In the second step, a shift to align the scale made up of link items and the scale made up of link items and new items (the so-called combined items scale) was computed using the following procedure. The PISA 2009 dataset was scaled twice, once using all the items and once using only link items. The difference between the OECD means of these two scalings was calculated and this shift was applied to align the link items only scale with the combined items scale. After applying this shift, the scores derived from the Item Response Theory (IRT) models were transformed to the PISA scale, which was done separately by gender.

As the equating procedure introduces random error related to performance changes on the link items, standard errors for performance trend estimates were adjusted. These more conservative standard errors reflect not only the measurement precision and sampling variation as for the usual PISA results, but also the linking error.

It should be noted that in addition to the 26 link items that were included in the three consecutive PISA cycles 2000, 2003 and 2006, an additional 11 items from PISA 2000 were included in the PISA 2009 assessment. The 39 items common to the two assessments were used to estimate the linking error between the PISA 2000 and 2009 reading scales while 28 items were used for the computation of the linking error for other cycles. Linking errors were added to all respective results whenever performance is compared across assessments. These linking errors are provided in Table A1.1.

Table A1.1 Link Error Estimates

	Link Error on PISA Scale
PISA Reading scale 2000 to 2003	**5.307**
PISA Reading scale 2000 to 2006	**4.976**
PISA Reading scale 2000 to 2009	**4.936**
PISA Reading scale 2003 to 2006	**4.474**
PISA Reading scale 2003 to 2009	**4.088**
PISA Reading scale 2006 to 2009	**4.069**
PISA Mathematics scale 2003 to 2009	**1.990**
PISA Mathematics scale 2006 to 2009	**1.333**
PISA Mathematics scale 2003 to 2006	**1.382**
PISA Science scale 2006 to 2009	**2.566**

How reading proficiency levels are defined in PISA 2009

PISA 2009 provides an overall reading literacy scale for the reading texts, drawing on all the questions in the reading assessment, as well as scales for three aspects and two text formats. The metric for the overall reading scale is based on a mean for OECD countries set at 500 in PISA 2000, with a standard deviation of 100. To help interpret what students' scores mean in substantive terms, the scale is divided into levels, based on a set of statistical principles, and then descriptions are generated, based on the tasks that are located within each level, to describe the kinds of skills and knowledge needed to successfully complete those tasks.

For PISA 2009, the range of difficulty of tasks allows for the description of seven levels of reading proficiency: Level 1b is the lowest described level, then Level 1a, Level 2, Level 3 and so on up to Level 6.

Students with a proficiency within the range of Level 1b are likely to be able to successfully complete Level 1b tasks (and others like them), but are unlikely to be able to complete tasks at higher levels. Level 6 reflects tasks that present the greatest challenge in terms of reading skills and knowledge. Students with scores in this range are likely to be able to complete reading tasks located at that level successfully, as well as all the other reading tasks in PISA.

PISA applies a standard methodology for constructing proficiency scales. Based on a student's performance on the tasks in the test, his or her score is generated and located in a specific part of the scale, thus allowing the score to be associated with a defined proficiency level. The level at which the student's score is located is the highest level for which he or she would be expected to answer correctly, most of a random selection of questions within the same level. Thus, for example, in an assessment composed of

tasks spread uniformly across Level 3, students with a score located within Level 3 would be expected to complete at least 50% of the tasks successfully. Because a level covers a range of difficulty and proficiency, success rates across the band vary. Students near the bottom of the level would be likely to succeed on just over 50% of the tasks spread uniformly across the level, while students at the top of the level would be likely to succeed on well over 70% of the same tasks.

Figure I.2.12 in Volume I provides details of the nature of reading skills, knowledge and understanding required at each level of the reading scale.

Explanation of indices

This section explains the indices derived from the student, school and parent context questionnaires used in PISA 2009. Parent questionnaire indices are only available for the 14 countries that chose to administer the optional parent questionnaire.

Several PISA measures reflect indices that summarise responses from students, their parents or school representatives (typically principals) to a series of related questions. The questions were selected from a larger pool of questions on the basis of theoretical considerations and previous research. Structural equation modelling was used to confirm the theoretically expected behaviour of the indices and to validate their comparability across countries. For this purpose, a model was estimated separately for each country and collectively for all OECD countries.

For a detailed description of other PISA indices and details on the methods, see the *PISA 2000 Technical Report* (OECD, 2002a), the *PISA 2003 Technical Report* (OECD, 2005), the *PISA 2006 Technical Report* (OECD, 2008) and the *PISA 2009 Technical Report* (OECD, forthcoming).

There are two types of indices: simple indices and scale indices.

Simple indices are the variables that are constructed through the arithmetic transformation or recoding of one or more items, in exactly the same way across assessments. Here, item responses are used to calculate meaningful variables, such as the recoding of the four-digit ISCO-88 codes into "Highest parents' socio-economic index (HISEI)" or, teacher-student ratio based on information from the school questionnaire.

Scale indices are the variables constructed through the scaling of multiple items. Unless otherwise indicated, the index was scaled using a weighted maximum likelihood estimate (WLE) (Warm, 1985), using a one-parameter item response model (a partial credit model was used in the case of items with more than two categories). Analogous to the reading performance scales, the indices derived from a student questionnaire have to be equated. This has been done by estimating item parameters using response data from all cycles, in which a trends index appears. This is known as the concurrent estimation of item parameters. Any items which were missing in a certain assessment were treated as structurally missing data in the estimation procedure.

The scaling was done in three stages:

- The item parameters were estimated from equal-sized subsamples of students from each OECD country and from each PISA assessment.
- The estimates were computed for all students and all schools by anchoring the item parameters obtained in the preceding step.
- The indices were then standardised for 2009 data so that the mean of the index value for the OECD student population was 0 and the standard deviation was 1 in 2009 (countries being given equal weight in the standardisation process).

Sequential codes were assigned to the different response categories of the questions in the sequence in which the latter appeared in the student, school or parent questionnaires. Where indicated in this section, these codes were inverted for the purpose of constructing indices or scales. It is important to note that negative values for an index do not necessarily imply that students responded negatively to the underlying questions. A negative value merely indicates that the respondents answered less positively than all respondents did on average across OECD countries. Likewise, a positive value on an index indicates that the respondents answered more favourably, or more positively, than respondents did, on average, in OECD countries.

As noted above, for the re-estimated indices the mean of the index value for the OECD student population in 2009 is 0 and the standard deviation is 1. However, means and standard deviations for previous assessments can depart from that. Indices re-estimated for trends analysis do not have to match values reported in previous reports. While country means and other statistics should be close to those reported previously, they could often differ slightly because in previous assessments indices were standardised in relation to the data from the earlier assessment and not with regard to 2009 results.

In addition to simple and scaled indices described in this annex, there are a number of variables from the questionnaires that correspond to single items not used to construct indices. These non-recoded variables have prefix of "ST" for the questionnaire items in the student questionnaire, "SC" for the items in the school questionnaire, and "PA" for the items in the parent questionnaire. All the context questionnaires as well as the PISA international database, including all variables, are available through *www.pisa.oecd.org*.

Student-level simple indices

Age

The variable AGE is calculated for trends differently than for 2009 results, because information on the actual month of testing, which was used to construct AGE index for the analysis of 2009 data, is not available for 2000. Thus, for the analysis of trends, the information on the middle month of the testing period was used instead. Results from all assessments were recomputed as the difference between the middle month and the year in which students were assessed and their month and year of birth, expressed in years and months.

Occupational status of parents

Occupational data for both a student's father and a student's mother were obtained by asking open-ended questions in the student questionnaire (ST9a, ST9b, ST12, ST13a, ST13b and ST16). The responses were coded to four-digit ISCO codes (ILO, 1990) and then mapped to Ganzeboom et al's SEI index (1992). Higher scores of SEI indicate higher levels of occupational status. The following three indices are obtained:

- Mother's occupational status (BMMJ).
- Father's occupational status (BFMJ).
- The highest occupational level of parents (HISEI) corresponds to the higher SEI score of either parent or to the only available parent's SEI score.

Educational level of parents

The educational level of parents is classified using ISCED (OECD, 1999) based on students' responses in the student questionnaire (ST10, ST11, ST14 and ST15). Please note that the question format for school education in PISA 2009 differs from the one used in PISA 2000, 2003 and 2006 but the method used to compute parental education is the same.

As in PISA 2000, 2003 and 2006, indices were constructed by selecting the highest level for each parent and then assigning them to the following categories: (0) None, (1) ISCED 1 (primary education), (2) ISCED 2 (lower secondary), (3) ISCED Level 3B or 3C (vocational/pre-vocational upper secondary), (4) ISCED 3A (upper secondary) and/or ISCED 4 (non-tertiary post-secondary), (5) ISCED 5B (vocational tertiary), (6) ISCED 5A, 6 (theoretically oriented tertiary and post-graduate). The following three indices with these categories are developed:

- Mother's educational level (MISCED).
- Father's educational level (FISCED).
- Highest educational level of parents (HISCED) corresponds to the higher ISCED level of either parent.

Highest educational level of parents was also converted into the number of years of schooling (PARED). For the conversion of level of education into years of schooling, see Table A1.2.

Relative grade

Data on the student's grade are obtained both from the student questionnaire (ST01) and from the student tracking form. As with all variables that are on both the tracking form and the questionnaire, inconsistencies between the two sources are reviewed and resolved during data-cleaning. In order to capture between-country variation, the relative grade index (GRADE) indicates whether students are at the modal grade in a country (value of 0), or whether they are below or above the modal grade level (+ x grades, - x grades).

The relationship between the grade and student performance was estimated through a multilevel model accounting for the following background variables: *i)* the ***PISA index of economic, social and cultural status***; *ii)* the ***PISA index of economic, social and cultural status*** squared; *iii)* the school mean of the ***PISA index of economic, social and cultural status***; *iv)* an indicator as to whether students were foreign born first-generation students; *v)* the percentage of first-generation students in the school; and *vi)* students' gender.

Table A1.3 presents the results of the multilevel model. Column 1 in Table A1.3 estimates the score point difference that is associated with one grade level (or school year). This difference can be estimated for the 32 OECD countries in which a sizeable number of 15-year-olds in the PISA samples were enrolled in at least two different grades. Since 15-year-olds cannot be assumed to be distributed at random across the grade levels, adjustments had to be made for the above-mentioned contextual factors that may relate to the assignment of students to the different grade levels. These adjustments are documented in columns 2 to 7 of the table. While it is possible to estimate the typical performance difference among students in two adjacent grades net of the effects of selection and contextual factors, this difference cannot automatically be equated with the progress that students have made over the last school year but should be interpreted as a lower boundary of the progress achieved. This is not only because different students were assessed but also because the content of the PISA assessment was not expressly designed to match what students had learned in the preceding school year but more broadly to assess the cumulative outcome of learning in school up to age 15. For

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Table A1.2 Levels of parental education converted into years of schooling

		Did not go to school	Completed ISCED Level 1 (primary education)	Completed ISCED Level 2 (lower secondary education)	Completed ISCED Levels3B or 3C (upper secondary education providing direct access to the labor market or to ISCED 5B programmes)	Completed ISCED Level 3A (upper secondary education providing access to ISCED 5A and 5B programmes) and/or ISCED Level 4 (non-tertiary post-secondary)	Completed ISCED Level 5A (university level tertiary education) or ISCED Level 6 (advanced research programmes)	Completed ISCED Level 5B (non-university tertiary education)
OECD	Australia	0.0	6.0	10.0	11.0	12.0	15.0	14.0
	Austria	0.0	4.0	9.0	12.0	12.5	17.0	15.0
	Belgium	0.0	6.0	9.0	12.0	12.0	17.0	14.5
	Canada	0.0	6.0	9.0	12.0	12.0	17.0	15.0
	Chile	0.0	6.0	8.0	12.0	12.0	17.0	16.0
	Czech Republic	0.0	5.0	9.0	11.0	13.0	16.0	16.0
	Denmark	0.0	6.0	9.0	12.0	12.0	17.0	15.0
	Estonia	0.0	4.0	9.0	12.0	12.0	16.0	15.0
	Finland	0.0	6.0	9.0	12.0	12.0	16.5	14.5
	France	0.0	5.0	9.0	12.0	12.0	15.0	14.0
	Germany	0.0	4.0	10.0	13.0	13.0	18.0	15.0
	Greece	0.0	6.0	9.0	11.5	12.0	17.0	15.0
	Hungary	0.0	4.0	8.0	10.5	12.0	16.5	13.5
	Iceland	0.0	7.0	10.0	13.0	14.0	18.0	16.0
	Ireland	0.0	6.0	9.0	12.0	12.0	16.0	14.0
	Israel	0.0	6.0	9.0	12.0	12.0	15.0	15.0
	Italy	0.0	5.0	8.0	12.0	13.0	17.0	16.0
	Japan	0.0	6.0	9.0	12.0	12.0	16.0	14.0
	Korea	0.0	6.0	9.0	12.0	12.0	16.0	14.0
	Luxembourg	0.0	6.0	9.0	12.0	13.0	17.0	16.0
	Mexico	0.0	6.0	9.0	12.0	12.0	16.0	14.0
	Netherlands	0.0	6.0	10.0	a	12.0	16.0	a
	New Zealand	0.0	5.5	10.0	11.0	12.0	15.0	14.0
	Norway	0.0	6.0	9.0	12.0	12.0	16.0	14.0
	Poland	0.0	a	8.0	11.0	12.0	16.0	15.0
	Portugal	0.0	6.0	9.0	12.0	12.0	17.0	15.0
	Scotland	0.0	7.0	11.0	13.0	13.0	16.0	16.0
	Slovak Republic	0.0	4.5	8.5	12.0	12.0	17.5	13.5
	Slovenia	0.0	4.0	8.0	11.0	12.0	16.0	15.0
	Spain	0.0	5.0	8.0	10.0	12.0	16.5	13.0
	Sweden	0.0	6.0	9.0	11.5	12.0	15.5	14.0
	Switzerland	0.0	6.0	9.0	12.5	12.5	17.5	14.5
	Turkey	0.0	5.0	8.0	11.0	11.0	15.0	13.0
	United Kingdom	0.0	6.0	9.0	12.0	13.0	16.0	15.0
	United States	0.0	6.0	9.0	a	12.0	16.0	14.0
Partners	Albania	0.0	6.0	9.0	12.0	12.0	16.0	16.0
	Argentina	0.0	6.0	10.0	12.0	12.0	17.0	14.5
	Azerbaijan	0.0	4.0	9.0	11.0	11.0	17.0	14.0
	Brazil	0.0	4.0	8.0	11.0	11.0	16.0	14.5
	Bulgaria	0.0	4.0	8.0	12.0	12.0	17.5	15.0
	Colombia	0.0	5.0	9.0	11.0	11.0	15.5	14.0
	Croatia	0.0	4.0	8.0	11.0	12.0	17.0	15.0
	Dubai (UAE)	0.0	5.0	9.0	12.0	12.0	16.0	15.0
	Hong Kong- China	0.0	6.0	9.0	11.0	13.0	16.0	14.0
	Indonesia	0.0	6.0	9.0	12.0	12.0	15.0	14.0
	Jordan	0.0	6.0	10.0	12.0	12.0	16.0	14.5
	Kazakhstan	0.0	4.0	9.0	11.5	12.5	15.0	14.0
	Kyrgyzstan	0.0	4.0	8.0	11.0	10.0	15.0	13.0
	Latvia	0.0	3.0	8.0	11.0	11.0	16.0	16.0
	Liechtenstein	0.0	5.0	9.0	11.0	13.0	17.0	14.0
	Lithuania	0.0	3.0	8.0	11.0	11.0	16.0	15.0
	Macao-China	0.0	6.0	9.0	11.0	12.0	16.0	15.0
	Montenegro	0.0	4.0	8.0	11.0	12.0	16.0	15.0
	Panama	0.0	6.0	9.0	12.0	12.0	16.0	a
	Peru	0.0	6.0	9.0	11.0	11.0	17.0	14.0
	Qatar	0.0	6.0	9.0	12.0	12.0	16.0	15.0
	Romania	0.0	4.0	8.0	11.5	12.5	16.0	14.0
	Russian Federation	0.0	4.0	9.0	11.5	12.0	15.0	a
	Serbia	0.0	4.0	8.0	11.0	12.0	17.0	14.5
	Shanghai-China	0.0	6.0	9.0	12.0	12.0	16.0	15.0
	Singapore	0.0	6.0	8.0	10.5	10.5	12.5	12.5
	Chinese Taipei	0.0	6.0	9.0	12.0	12.0	16.0	14.0
	Thailand	0.0	6.0	9.0	12.0	12.0	16.0	14.0
	Trinidad and Tobago	0.0	5.0	9.0	12.0	12.0	16.0	15.0
	Tunisia	0.0	6.0	9.0	12.0	13.0	17.0	16.0
	Uruguay	0.0	6.0	9.0	12.0	12.0	17.0	15.0

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Table A1.3 A multilevel model to estimate grade effects in reading, accounting for some background variables

		Grade		Index of economic, social and cultural status		Index of economic, social and cultural status squared		School mean index of economic, social and cultural status		First generation students		School percentage of first generation students		Gender – student is a female		Intercept	
		Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.
OECD	Australia	33.2	(1.95)	30.0	(1.36)	-3.8	(1.05)	66.4	(1.87)	-7.4	(2.82)	0.1	(0.07)	32.9	(1.91)	466.0	(1.39)
	Austria	35.3	(2.18)	11.4	(1.66)	-0.5	(1.00)	89.7	(3.86)	-33.1	(6.11)	1.4	(0.13)	19.9	(2.67)	467.9	(2.45)
	Belgium	48.9	(1.98)	10.0	(1.12)	-0.1	(0.63)	79.9	(1.73)	-3.2	(5.18)	0.3	(0.11)	11.3	(1.81)	507.0	(1.70)
	Canada	45.0	(2.14)	19.4	(1.52)	1.5	(0.91)	33.9	(2.28)	-13.7	(3.18)	0.3	(0.04)	30.4	(1.60)	483.4	(1.76)
	Chile	35.5	(1.55)	8.6	(1.52)	0.3	(0.63)	37.4	(1.61)	c	c	c	c	13.8	(2.33)	478.6	(1.60)
	Czech Republic	44.6	(3.39)	13.4	(1.89)	-2.3	(1.47)	111.5	(3.12)	-8.9	(12.29)	0.4	(0.33)	32.3	(2.84)	460.7	(2.39)
	Denmark	36.1	(3.02)	27.9	(1.51)	-2.8	(1.10)	35.1	(2.91)	-37.5	(5.97)	0.0	(0.14)	25.5	(2.59)	474.0	(1.95)
	Estonia	44.4	(2.74)	14.1	(1.80)	1.6	(1.43)	52.1	(4.52)	-18.7	(14.08)	-3.3	(0.44)	36.7	(2.45)	485.8	(2.02)
	Finland	37.3	(3.60)	27.7	(1.66)	-2.5	(1.30)	10.4	(3.28)	-56.0	(13.09)	-0.1	(0.29)	51.5	(2.26)	500.6	(2.02)
	France	47.1	(5.14)	12.5	(1.70)	-1.9	(1.12)	81.6	(4.04)	-11.6	(9.24)	0.2	(0.15)	25.9	(2.67)	516.5	(2.35)
	Germany	34.4	(1.74)	9.2	(1.23)	-1.6	(0.74)	109.1	(2.16)	-13.2	(4.80)	0.2	(0.12)	27.2	(1.92)	458.0	(1.46)
	Greece	22.6	(10.86)	15.9	(1.46)	1.5	(1.07)	41.2	(2.84)	-15.0	(7.82)	0.0	(0.18)	36.2	(2.55)	469.0	(2.04)
	Hungary	25.6	(2.19)	8.3	(1.39)	0.9	(0.87)	74.8	(2.09)	2.8	(7.92)	0.0	(0.27)	21.4	(2.22)	494.1	(1.65)
	Iceland	c	c	29.8	(2.56)	-5.1	(1.56)	-3.8	(5.12)	-52.2	(11.45)	-1.3	(0.40)	44.9	(2.59)	469.1	(4.23)
	Ireland	18.2	(1.99)	29.7	(1.78)	-3.5	(1.44)	43.6	(2.68)	-32.8	(6.52)	-0.1	(0.20)	33.9	(3.62)	474.8	(2.77)
	Israel	36.6	(3.85)	19.9	(1.90)	3.4	(1.04)	104.7	(2.10)	-11.0	(6.13)	1.5	(0.08)	29.4	(2.81)	460.1	(2.13)
	Italy	36.1	(1.67)	4.5	(0.69)	-1.4	(0.42)	76.4	(1.07)	-29.7	(3.36)	0.2	(0.08)	24.0	(1.29)	491.4	(0.85)
	Japan	a	a	4.1	(1.51)	0.1	(1.47)	144.2	(2.40)	c	c	c	c	27.9	(2.43)	508.6	(1.58)
	Korea	31.2	(9.77)	12.9	(1.42)	1.9	(1.18)	64.9	(2.24)	a	a	a	a	30.6	(3.21)	537.7	(2.08)
	Luxembourg	45.3	(1.95)	16.6	(1.31)	-2.6	(1.08)	62.0	(2.89)	-10.4	(5.11)	-0.2	(0.10)	33.0	(2.22)	435.7	(2.40)
	Mexico	32.6	(1.59)	7.5	(0.92)	0.8	(0.34)	27.8	(0.80)	-41.9	(6.36)	-1.8	(0.15)	17.9	(1.03)	473.7	(1.02)
	Netherlands	26.6	(2.04)	6.0	(1.52)	-1.2	(1.02)	106.7	(2.32)	-11.6	(5.72)	1.7	(0.14)	15.3	(1.85)	484.5	(2.33)
	New Zealand	44.2	(4.15)	38.9	(1.82)	-1.7	(1.44)	56.3	(3.35)	-12.2	(3.84)	0.0	(0.10)	44.8	(2.62)	496.5	(2.44)
	Norway	37.6	(18.19)	34.2	(2.00)	-3.4	(1.62)	31.1	(4.32)	-33.4	(7.52)	0.4	(0.25)	48.3	(2.56)	453.2	(2.87)
	Poland	73.8	(4.44)	29.4	(1.59)	-1.8	(1.21)	19.4	(2.99)	c	c	c	c	44.2	(2.41)	498.9	(1.89)
	Portugal	48.9	(1.71)	12.0	(0.94)	1.0	(0.64)	21.3	(1.33)	-5.3	(5.75)	0.0	(0.23)	22.9	(1.84)	518.6	(1.92)
	Slovak Republic	34.2	(3.85)	14.7	(1.44)	-3.2	(0.98)	64.3	(6.30)	c	c	c	c	39.1	(2.58)	483.2	(2.33)
	Slovenia	22.8	(3.41)	4.8	(1.28)	0.0	(1.25)	100.2	(2.74)	-23.4	(7.48)	-0.2	(0.24)	27.7	(2.16)	452.4	(1.63)
	Spain	61.7	(1.22)	9.8	(0.83)	0.4	(0.64)	22.7	(1.25)	-29.7	(2.86)	0.4	(0.04)	18.0	(1.42)	511.3	(1.07)
	Sweden	63.8	(6.69)	31.4	(1.82)	-1.3	(1.04)	49.0	(6.55)	-38.8	(8.53)	0.3	(0.34)	43.2	(2.41)	454.4	(3.62)
	Switzerland	45.5	(2.75)	18.2	(1.27)	-1.0	(1.23)	59.5	(2.95)	-25.1	(3.99)	-0.7	(0.11)	27.0	(2.00)	488.8	(1.50)
	Turkey	33.7	(1.96)	7.7	(1.50)	0.3	(0.61)	46.3	(1.70)	c	c	c	c	27.9	(1.74)	524.0	(1.59)
	United Kingdom	35.9	(6.21)	27.7	(2.01)	-0.3	(1.51)	65.7	(2.49)	-13.6	(8.49)	-0.3	(0.13)	23.1	(2.48)	468.7	(1.73)
	United States	36.3	(2.17)	23.5	(1.70)	4.4	(1.15)	50.4	(2.56)	-5.6	(5.57)	0.8	(0.14)	25.4	(2.36)	463.5	(2.01)
Partners	Albania	11.9	(5.07)	20.8	(3.04)	3.2	(1.35)	43.0	(2.47)	c	c	c	c	56.5	(3.40)	421.5	(3.44)
	Argentina	33.6	(2.50)	11.2	(1.96)	0.9	(0.87)	52.6	(2.03)	-27.0	(10.55)	0.5	(0.20)	24.0	(2.38)	439.7	(2.32)
	Azerbaijan	13.2	(1.78)	10.5	(1.67)	1.3	(0.90)	36.4	(2.00)	-9.8	(12.34)	-0.3	(0.49)	22.6	(2.16)	390.9	(2.12)
	Brazil	36.1	(1.23)	7.7	(1.54)	1.3	(0.57)	38.3	(1.25)	-71.7	(17.16)	-0.9	(0.47)	20.2	(1.63)	445.5	(1.33)
	Bulgaria	27.8	(5.08)	15.7	(1.93)	0.2	(1.29)	75.7	(3.99)	c	c	c	c	42.1	(3.51)	423.7	(2.61)
	Colombia	33.2	(1.12)	6.9	(2.01)	0.9	(0.72)	39.4	(1.53)	c	c	c	c	3.2	(2.17)	477.7	(1.83)
	Croatia	31.8	(2.33)	10.3	(1.36)	-4.0	(0.99)	75.3	(2.01)	-13.0	(5.71)	-0.1	(0.22)	31.4	(2.56)	472.8	(1.69)
	Dubai (UAE)	34.6	(1.56)	15.2	(1.52)	3.2	(1.03)	25.9	(3.13)	21.5	(3.25)	1.1	(0.05)	28.2	(3.94)	362.4	(2.92)
	Hong Kong-China	33.6	(2.03)	-0.9	(1.70)	-1.0	(0.76)	41.9	(1.64)	23.4	(3.70)	-0.4	(0.06)	21.9	(2.42)	575.8	(1.83)
	Indonesia	14.4	(2.00)	4.7	(2.44)	0.9	(0.62)	29.1	(1.83)	c	c	c	c	28.0	(1.48)	430.8	(2.46)
	Jordan	47.6	(6.38)	17.7	(1.52)	0.7	(0.81)	26.9	(1.55)	-11.5	(7.50)	-0.2	(0.20)	48.1	(2.73)	415.5	(2.04)
	Kazakhstan	22.2	(2.42)	16.2	(2.12)	-1.7	(1.31)	55.7	(2.70)	-12.2	(6.78)	0.0	(0.10)	38.1	(2.23)	411.1	(1.57)
	Kyrgyzstan	20.8	(2.92)	18.3	(2.23)	1.7	(1.10)	75.2	(2.03)	-23.4	(21.78)	3.3	(0.50)	46.0	(2.45)	345.7	(1.83)
	Latvia	43.8	(3.07)	16.2	(1.89)	-0.8	(1.35)	37.0	(2.77)	c	c	c	c	38.9	(2.36)	479.6	(1.77)
	Liechtenstein	23.8	(7.40)	2.1	(4.18)	-5.3	(3.07)	112.5	(12.17)	-12.6	(10.22)	-0.7	(0.44)	20.3	(6.86)	499.8	(8.42)
	Lithuania	27.4	(2.87)	18.1	(1.56)	0.2	(1.04)	44.0	(2.45)	c	c	c	c	51.1	(2.34)	447.6	(1.87)
	Macao-China	36.7	(1.01)	1.8	(1.61)	-1.1	(0.78)	1.0	(4.75)	16.7	(2.17)	-0.1	(0.23)	14.1	(1.51)	511.0	(3.47)
	Montenegro	22.9	(3.44)	12.1	(1.38)	-0.3	(1.05)	64.2	(6.54)	-1.8	(6.69)	-1.2	(0.32)	39.3	(2.63)	409.5	(2.58)
	Panama	32.6	(3.41)	7.9	(2.42)	1.2	(0.79)	45.8	(2.60)	-3.4	(10.77)	-1.4	(0.16)	15.8	(4.48)	431.3	(3.22)
	Peru	27.5	(1.23)	10.5	(2.05)	0.9	(0.64)	47.2	(1.46)	c	c	c	c	8.3	(2.17)	445.6	(1.59)
	Qatar	30.7	(1.70)	5.3	(0.98)	0.4	(0.85)	12.7	(2.91)	31.5	(2.98)	1.7	(0.07)	31.4	(3.71)	302.5	(2.94)
	Romania	19.6	(4.19)	10.7	(1.63)	-0.3	(0.79)	63.9	(2.34)	c	c	c	c	13.7	(2.56)	446.4	(1.70)
	Russian Federation	31.0	(2.01)	18.2	(1.93)	-1.6	(1.40)	38.8	(3.32)	-9.1	(5.88)	-0.4	(0.22)	38.7	(2.28)	452.9	(1.89)
	Serbia	21.3	(4.48)	9.2	(1.25)	-0.8	(0.74)	55.1	(3.42)	1.2	(5.65)	0.3	(0.13)	27.1	(2.22)	425.1	(1.60)
	Shanghai-China	21.8	(3.34)	4.6	(1.41)	0.1	(0.85)	57.3	(1.48)	c	c	c	c	29.3	(1.98)	583.5	(2.04)
	Singapore	28.9	(2.09)	22.2	(2.19)	-2.8	(1.14)	104.7	(2.86)	0.4	(4.21)	-1.0	(0.13)	24.6	(2.57)	590.2	(2.76)
	Chinese Taipei	15.4	(4.12)	15.5	(1.50)	-1.2	(1.05)	82.8	(3.06)	c	c	c	c	36.8	(2.25)	515.6	(2.03)
	Thailand	22.1	(2.05)	10.4	(1.54)	2.4	(0.66)	28.8	(1.31)	a	a	a	a	31.3	(1.78)	454.6	(1.67)
	Trinidad and Tobago	35.3	(1.60)	-0.6	(2.00)	-0.2	(0.91)	123.2	(3.42)	-9.2	(13.59)	-0.7	(0.28)	40.4	(2.90)	484.9	(2.77)
	Tunisia	49.7	(1.57)	3.7	(1.76)	0.7	(0.56)	17.8	(1.25)	c	c	c	c	14.4	(1.84)	449.6	(1.63)
	Uruguay	41.4	(1.49)	12.4	(1.58)	0.5	(0.75)	29.7	(1.58)	c	c	c	c	30.1	(2.48)	464.2	(2.29)

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example, if the curriculum of the grades in which 15-year-olds are enrolled mainly includes material other than that assessed by PISA (which, in turn, may have been included in earlier school years) then the observed performance difference will underestimate student progress.

Immigration and language background

Information on the country of birth of students and their parents (ST17) is collected in a similar manner as in PISA 2000, PISA 2003 and PISA 2006 by using nationally specific ISO coded variables. The ISO codes of the country of birth for students and their parents are available in the PISA international database (COBN_S, COBN_M, and COBN_F).

For trends analysis, a dichotomous index was constructed that has the following categories: (1) native students (those students born in the country of assessment, or those with at least one parent born in that country; students who were born abroad with at least one parent born in the country of assessment are also classified as 'native' students), (2) second- and first-generation students (those born in the country of assessment but whose parents were born in another country and those born outside the country of assessment and whose parents were also born in another country). Students with missing responses for either the student or for both parents, or for all three questions have been given missing values for this variable.

Students indicate the language they usually speak at home. The data are captured in nationally-specific language codes, which were recoded into variable ST19Q01 with the following two values: (1) language at home is the same as the language of assessment, and (2) language at home is a different language than the language of assessment. Similar recoding was used in 2003 and 2006. In 2000 students directly provided information on whether they speak the language of assessment or another language at home. These responses were dichotomised and compared to recoded values for 2003, 2006 and 2009.

Student-level scale indices

Four indices were created based on possessions at home, namely, WEALTH, CULTPOSS, HEDRES and HOMEPOS. These are described in more detail below. These indices were estimated in two steps. As international item parameters were not deemed suitable to estimate scales for possessions at home, a two step procedure was adopted. In step 1 a concurrent estimation was done to compute these indices using national item parameters (*i.e.* item parameters were estimated within countries.) This made it possible to see within country trends in the possessions indices. However, in order to enable comparisons across countries for these scales, the relative positions of the countries were estimated on a joint scale. The resulting differences in the means of the possessions indices were imposed on the weighted maximum likelihood estimates (from step 1) using a linear transformation.

Family wealth

The *index of family wealth* (WEALTH) is based on the students' responses on whether they had the following at home: a room of their own, a link to the Internet, a dishwasher (treated as a country-specific item), a DVD player, and three other country-specific items (some items in ST20); and their responses on the number of cellular phones, televisions, computers, cars and the rooms with a bath or shower (ST21).

Home educational resources

The *index of home educational resources* (HEDRES) is based on the items measuring the existence of educational resources at home including a desk and a quiet place to study, a computer that students can use for schoolwork, educational software, books to help with students' school work, technical reference books and a dictionary (some items in ST20).

Cultural possessions

The *index of cultural possessions* (CULTPOSS) is based on the students' responses to whether they had the following at home: classic literature, books of poetry and works of art (some items in ST20).

Economic, social and cultural status

The *PISA index of economic, social and cultural status* (ESCS) was derived from the following three indices: highest occupational status of parents (HISEI), highest educational level of parents in years of education according to ISCED (PARED), and home possessions (HOMEPOS). The index of home possessions (HOMEPOS) comprises all items on the indices of WEALTH, CULTPOSS and HEDRES, as well as books in the home recoded into a four-level categorical variable (0-10 books, 11-25 or 26-100 books, 101-200 or 201-500 books, more than 500 books). In order to facilitate a trends study similar ISCED levels to PARED mappings were used for each cycle and the *index on home possessions* (HOMEPOS) was also estimated concurrently across cycles.

The *PISA index of economic, social and cultural status* (ESCS) was derived from a principal component analysis of standardised variables (each variable has an OECD mean of 0 and a standard deviation of 1), taking the factor scores for the first principal component as measures of the index of economic, social and cultural status.

Principal component analysis was also performed for each participating country to determine to what extent the components of

the index operate in similar ways across countries. The analysis revealed that patterns of factor loading were very similar across countries, with all three components contributing to a similar extent to the index. For the occupational component, the average factor loading was 0.80, ranging from 0.66 to 0.87 across countries. For the educational component, the average factor loading was 0.79, ranging from 0.69 to 0.87 across countries. For the home possession component, the average factor loading was 0.73, ranging from 0.60 to 0.84 across countries. The reliability of the index ranged from 0.41 to 0.81. These results support the cross-national validity of the *PISA index of economic, social and cultural status*.

The imputation of components for students missing data on one component was done on the basis of a regression on the other two variables, with an additional random error component. The final values on the *PISA index of economic, social and cultural status* (ESCS) have an OECD mean of 0 and a standard deviation of 1.

Enjoyment of reading activities

The *index of enjoyment of reading activities* (ENJOY) was derived from students' level of agreement with the following statements (ST24 in 2009 and ST35 in 2000): i) I read only if I have to; ii) reading is one of my favourite hobbies; iii) I like talking about books with other people; iv) I find it hard to finish books; v) I feel happy if I receive a book as a present; vi) for me, reading is a waste of time; vii) I enjoy going to a bookstore or a library; viii) I read only to get information that I need; ix) I cannot sit still and read for more than a few minutes; (x) I like to express my opinions about books I have read; and (xi) I like to exchange books with my friends.

As all items that are negatively phrased (items i, iv, vi, viii and ix) are inverted for scaling, the higher values on this index indicate higher levels of enjoyment of reading.

Diversity of reading materials

The *index of diversity of reading materials* (DIVREAD) was derived from the frequency with which students read the following materials because they want to (ST25 in 2009 and ST36 in 2000): magazines, comic books, fiction, non-fiction books and newspapers. The higher values on this index indicate higher diversity in reading.

ANNEX A2
THE PISA TARGET POPULATION, THE PISA SAMPLES AND THE DEFINITION OF SCHOOLS

Definition of the PISA target population

PISA 2009 provides an assessment of the cumulative yield of education and learning at a point at which most young adults are still enrolled in initial education.

A major challenge for an international survey is to ensure that international comparability of national target populations is guaranteed in such a venture.

Differences between countries in the nature and extent of pre-primary education and care, the age of entry into formal schooling and the institutional structure of educational systems do not allow the definition of internationally comparable grade levels of schooling. Consequently, international comparisons of educational performance typically define their populations with reference to a target age group. Some previous international assessments have defined their target population on the basis of the grade level that provides maximum coverage of a particular age cohort. A disadvantage of this approach is that slight variations in the age distribution of students across grade levels often lead to the selection of different target grades in different countries, or between education systems within countries, raising serious questions about the comparability of results across, and at times within, countries. In addition, because not all students of the desired age are usually represented in grade-based samples, there may be a more serious potential bias in the results if the unrepresented students are typically enrolled in the next higher grade in some countries and the next lower grade in others. This would exclude students with potentially higher levels of performance in the former countries and students with potentially lower levels of performance in the latter.

In order to address this problem, PISA uses an age-based definition for its target population, *i.e.* a definition that is not tied to the institutional structures of national education systems. PISA assesses students who were aged between 15 years and 3 (complete) months and 16 years and 2 (complete) months at the beginning of the assessment period, plus or minus a 1 month allowable variation, and who were enrolled in an educational institution with Grade 7 or higher, regardless of the grade levels or type of institution in which they were enrolled, and regardless of whether they were in full-time or part-time education. Educational institutions are generally referred to as schools in this publication, although some educational institutions (in particular, some types of vocational education establishments) may not be termed schools in certain countries. As expected from this definition, the average age of students across OECD countries was 15 years and 9 months. The range in country means was 2 months and 5 days (0.18 years), from the minimum country mean of 15 years and 8 months to the maximum country mean of 15 years and 10 months.

Given this definition of population, PISA makes statements about the knowledge and skills of a group of individuals who were born within a comparable reference period, but who may have undergone different educational experiences both in and outside of schools. In PISA, these knowledge and skills are referred to as the yield of education at an age that is common across countries. Depending on countries' policies on school entry, selection and promotion, these students may be distributed over a narrower or a wider range of grades across different education systems, tracks or streams. It is important to consider these differences when comparing PISA results across countries, as observed differences between students at age 15 may no longer appear as students' educational experiences converge later on.

If a country's scale scores in reading, scientific or mathematical literacy are significantly higher than those in another country, it cannot automatically be inferred that the schools or particular parts of the education system in the first country are more effective than those in the second. However, one can legitimately conclude that the cumulative impact of learning experiences in the first country, starting in early childhood and up to the age of 15, and embracing experiences both in school, home and beyond, have resulted in higher outcomes in the literacy domains that PISA measures.

The PISA target population did not include residents attending schools in a foreign country. It does, however, include foreign nationals attending schools in the country of assessment.

To accommodate countries that desired grade-based results for the purpose of national analyses, PISA 2009 provided a sampling option to supplement age-based sampling with grade-based sampling.

Population coverage

All countries attempted to maximise the coverage of 15-year-olds enrolled in education in their national samples, including students enrolled in special educational institutions. As a result, PISA 2009 reached standards of population coverage that are unprecedented in international surveys of this kind.

The sampling standards used in PISA permitted countries to exclude up to a total of 5% of the relevant population either by excluding schools or by excluding students within schools. All but 5 countries, Denmark (8.17%), Luxembourg (8.15%), Canada (6.00%), Norway (5.93%) and the United States (5.16%), achieved this standard, and in 36 countries and economies, the overall exclusion rate was less than 2%. When language exclusions were accounted for (*i.e.* removed from the overall exclusion rate), the United States no longer had an exclusion rate greater than 5%. For details, see *www.pisa.oecd.org*.

Exclusions within the above limits include:

- *At the school level: i)* schools that were geographically inaccessible or where the administration of the PISA assessment was not considered feasible; and *ii)* schools that provided teaching only for students in the categories defined under "within-school exclusions", such as schools for the blind. The percentage of 15-year-olds enrolled in such schools had to be less than 2.5% of the nationally desired target population [0.5% maximum for *i)* and 2% maximum for *ii)*]. The magnitude, nature and justification of school-level exclusions are documented in the *PISA 2009 Technical Report* (OECD, forthcoming).
- *At the student level: i)* students with an intellectual disability; *ii)* students with a functional disability; *iii)* students with limited assessment language proficiency; *iv)* other – a category defined by the national centres and approved by the international centre; and *v)* students taught in a language of instruction for the main domain for which no materials were available. Students could not be excluded solely because of low proficiency or common discipline problems. The percentage of 15-year-olds excluded within schools had to be less than 2.5% of the nationally desired target population.

Table A2.1 describes the target population of the countries participating in PISA 2009. Further information on the target population and the implementation of PISA sampling standards can be found in the *PISA 2009 Technical Report* (OECD, forthcoming).

- ***Column 1*** shows the **total number of 15-year-olds** according to the most recent available information, which in most countries meant the year 2008 as the year before the assessment.
- ***Column 2*** shows the number of 15-year-olds enrolled in schools in Grade 7 or above (as defined above), which is referred to as the **eligible population**.
- ***Column 3*** shows the **national desired target population**. Countries were allowed to exclude up to 0.5% of students *a priori* from the eligible population, essentially for practical reasons. The following *a priori* exclusions exceed this limit but were agreed with the PISA Consortium: Canada excluded 1.1% of its population from Territories and Aboriginal reserves; France excluded 1.7% of its students in its *territoires d'outre-mer* and other institutions; Indonesia excluded 4.7% of its students from four provinces because of security reasons; Kyrgyzstan excluded 2.3% of its population in remote, inaccessible schools; and Serbia excluded 2% of its students taught in Serbian in Kosovo.
- ***Column 4*** shows the **number of students enrolled in schools that were excluded from the national desired target population** either from the sampling frame or later in the field during data collection.
- ***Column 5*** shows the **size of the national desired target population after subtracting the students enrolled in excluded schools**. This is obtained by subtracting Column 4 from Column 3.
- ***Column 6*** shows the **percentage of students enrolled in excluded schools**. This is obtained by dividing Column 4 by Column 3 and multiplying by 100.
- ***Column 7*** shows the **number of students participating in PISA 2009**. Note that in some cases this number does not account for 15-year-olds assessed as part of additional national options.
- ***Column 8*** shows the **weighted number of participating students**, *i.e.* the number of students in the nationally defined target population that the PISA sample represents.
- Each country attempted to maximise the coverage of PISA's target population within the sampled schools. In the case of each sampled school, all eligible students, namely those 15 years of age, regardless of grade, were first listed. Sampled students who were to be excluded had still to be included in the sampling documentation, and a list drawn up stating the reason for their exclusion. ***Column 9*** indicates the **total number of excluded students,** which is further described and classified into specific categories in Table A2.2. ***Column 10*** indicates the **weighted number of excluded students,** *i.e.* the overall number of students in the nationally defined target population represented by the number of students excluded from the sample, which is also described and classified by exclusion categories in Table A2.2. Excluded students were excluded based on five categories: *i)* students with an intellectual disability – the student has a mental or emotional disability and is cognitively delayed such that he/she cannot perform in the PISA testing situation; *ii)* students with a functional disability – the student has a moderate to severe permanent physical disability such that he/she cannot perform in the PISA testing situation; *iii)* students with a limited assessment language proficiency – the student is unable to read or speak any of the languages of the assessment in the country and would be unable to overcome the language barrier in the testing situation (typically a student who has received less than one year of instruction in the languages of the assessment may be excluded); *iv)* other – a category defined by the national centres and approved by the international centre; and *v)* students taught in a language of instruction for the main domain for which no materials were available.
- ***Column 11*** shows the **percentage of students excluded within schools**. This is calculated as the weighted number of excluded students (Column 10), divided by the weighted number of excluded and participating students (Column 8 plus Column 10), then multiplied by 100.

[Part 1/2]

Table A2.1 PISA target populations and samples

		Population and sample information							
		Total population of 15-year-olds	Total enrolled population of 15-year-olds at Grade 7 or above	Total in national desired target population	Total school-level exclusions	Total in national desired target population after all school exclusions and before within-school exclusions	School-level exclusion rate (%)	Number of participating students	Weighted number of participating students
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OECD	Australia	286 334	269 669	269 669	7 057	262 612	2.62	14 251	240 851
	Austria	99 818	94 192	94 192	115	94 077	0.12	6 590	87 326
	Belgium	126 377	126 335	126 335	2 474	123 861	1.96	8 501	119 140
	Canada	430 791	426 590	422 052	2 370	419 682	0.56	23 207	360 286
	Chile	290 056	265 542	265 463	2 594	262 869	0.98	5 669	247 270
	Czech Republic	122 027	116 153	116 153	1 619	114 534	1.39	6 064	113 951
	Denmark	70 522	68 897	68 897	3 082	65 815	4.47	5 924	60 855
	Estonia	14 248	14 106	14 106	436	13 670	3.09	4 727	12 978
	Finland	66 198	66 198	66 198	1 507	64 691	2.28	5 810	61 463
	France	749 808	732 825	720 187	18 841	701 346	2.62	4 298	677 620
	Germany	852 044	852 044	852 044	7 138	844 906	0.84	4 979	766 993
	Greece	102 229	105 664	105 664	696	104 968	0.66	4 969	93 088
	Hungary	121 155	118 387	118 387	3 322	115 065	2.81	4 605	105 611
	Iceland	4 738	4 738	4 738	20	4 718	0.42	3 646	4 410
	Ireland	56 635	55 464	55 446	276	55 170	0.50	3 937	52 794
	Israel	122 701	112 254	112 254	1 570	110 684	1.40	5 761	103 184
	Italy	586 904	573 542	573 542	2 694	570 848	0.47	30 905	506 733
	Japan	1 211 642	1 189 263	1 189 263	22 955	1 166 308	1.93	6 088	1 113 403
	Korea	717 164	700 226	700 226	2 927	697 299	0.42	4 989	630 030
	Luxembourg	5 864	5 623	5 623	186	5 437	3.31	4 622	5 124
	Mexico	2 151 771	1 425 397	1 425 397	5 825	1 419 572	0.41	38 250	1 305 461
	Netherlands	199 000	198 334	198 334	6 179	192 155	3.12	4 760	183 546
	New Zealand	63 460	60 083	60 083	645	59 438	1.07	4 643	55 129
	Norway	63 352	62 948	62 948	1 400	61 548	2.22	4 660	57 367
	Poland	482 500	473 700	473 700	7 650	466 050	1.61	4 917	448 866
	Portugal	115 669	107 583	107 583	0	107 583	0.00	6 298	96 820
	Slovak Republic	72 826	72 454	72 454	1 803	70 651	2.49	4 555	69 274
	Slovenia	20 314	19 571	19 571	174	19 397	0.89	6 155	18 773
	Spain	433 224	425 336	425 336	3 133	422 203	0.74	25 887	387 054
	Sweden	121 486	121 216	121 216	2 323	118 893	1.92	4 567	113 054
	Switzerland	90 623	89 423	89 423	1 747	87 676	1.95	11 812	80 839
	Turkey	1 336 842	859 172	859 172	8 569	850 603	1.00	4 996	757 298
	United Kingdom	786 626	786 825	786 825	17 593	769 232	2.24	12 179	683 380
	United States	4 103 738	4 210 475	4 210 475	15 199	4 195 276	0.36	5 233	3 373 264
Partners	Albania	55 587	42 767	42 767	372	42 395	0.87	4 596	34 134
	Argentina	688 434	636 713	636 713	2 238	634 475	0.35	4 774	472 106
	Azerbaijan	185 481	184 980	184 980	1 886	183 094	1.02	4 727	105 886
	Brazil	3 292 022	2 654 489	2 654 489	15 571	2 638 918	0.59	20 127	2 080 159
	Bulgaria	80 226	70 688	70 688	1 369	69 319	1.94	4 507	57 833
	Colombia	893 057	582 640	582 640	412	582 228	0.07	7 921	522 388
	Croatia	48 491	46 256	46 256	535	45 721	1.16	4 994	43 065
	Dubai (UAE)	10 564	10 327	10 327	167	10 160	1.62	5 620	9 179
	Hong Kong-China	85 000	78 224	78 224	809	77 415	1.03	4 837	75 548
	Indonesia	4 267 801	3 158 173	3 010 214	10 458	2 999 756	0.35	5 136	2 259 118
	Jordan	117 732	107 254	107 254	0	107 254	0.00	6 486	104 056
	Kazakhstan	281 659	263 206	263 206	7 210	255 996	2.74	5 412	250 657
	Kyrgyzstan	116 795	93 989	91 793	1 149	90 644	1.25	4 986	78 493
	Latvia	28 749	28 149	28 149	943	27 206	3.35	4 502	23 362
	Liechtenstein	399	360	360	5	355	1.39	329	355
	Lithuania	51 822	43 967	43 967	522	43 445	1.19	4 528	40 530
	Macao-China	7 500	5 969	5 969	3	5 966	0.05	5 952	5 978
	Montenegro	8 500	8 493	8 493	10	8 483	0.12	4 825	7 728
	Panama	57 919	43 623	43 623	501	43 122	1.15	3 969	30 510
	Peru	585 567	491 514	490 840	984	489 856	0.20	5 985	427 607
	Qatar	10 974	10 665	10 665	114	10 551	1.07	9 078	9 806
	Romania	152 084	152 084	152 084	679	151 405	0.45	4 776	151 130
	Russian Federation	1 673 085	1 667 460	1 667 460	25 012	1 642 448	1.50	5 308	1 290 047
	Serbia	85 121	75 128	73 628	1 580	72 048	2.15	5 523	70 796
	Shanghai-China	112 000	100 592	100 592	1 287	99 305	1.28	5 115	97 045
	Singapore	54 982	54 212	54 212	633	53 579	1.17	5 283	51 874
	Chinese Taipei	329 249	329 189	329 189	1 778	327 411	0.54	5 831	297 203
	Thailand	949 891	763 679	763 679	8 438	755 241	1.10	6 225	691 916
	Trinidad and Tobago	19 260	17 768	17 768	0	17 768	0.00	4 778	14 938
	Tunisia	153 914	153 914	153 914	0	153 914	0.00	4 955	136 545
	Uruguay	53 801	43 281	43 281	30	43 251	0.07	5 957	33 971

Note: For a full explanation of the details in this table, please refer to the *PISA 2009 Technical Report* (OECD, forthcoming). The figure for total national population of 15-year-olds enrolled in Column 1 may occasionally be larger than the total number of 15-year-olds in Column 2 due to differing data sources. In Greece, Column 1 does not include immigrants but Column 2 does include immigrants.

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[Part 2/2]

Table A2.1 PISA target populations and samples

		Population and sample information				Coverage indices		
		Number of excluded students	Weighted number of excluded students	Within-school exclusion rate (%)	Overall exclusion rate (%)	Coverage index 1: Coverage of national desired population	Coverage index 2: Coverage of national enrolled population	Coverage index 3: Coverage of 15-year-old population
		(9)	(10)	(11)	(12)	(13)	(14)	(15)
OECD	Australia	313	4 389	1.79	4.36	0.956	0.956	0.841
	Austria	45	607	0.69	0.81	0.992	0.992	0.875
	Belgium	30	292	0.24	2.20	0.978	0.978	0.943
	Canada	1 607	20 837	5.47	6.00	0.940	0.930	0.836
	Chile	15	620	0.25	1.22	0.988	0.987	0.852
	Czech Republic	24	423	0.37	1.76	0.982	0.982	0.934
	Denmark	296	2 448	3.87	8.17	0.918	0.918	0.863
	Estonia	32	97	0.74	3.81	0.962	0.962	0.911
	Finland	77	717	1.15	3.40	0.966	0.966	0.928
	France	1	304	0.04	2.66	0.973	0.957	0.904
	Germany	28	3 591	0.47	1.30	0.987	0.987	0.900
	Greece	142	2 977	3.10	3.74	0.963	0.963	0.911
	Hungary	10	361	0.34	3.14	0.969	0.969	0.872
	Iceland	187	189	4.10	4.50	0.955	0.955	0.931
	Ireland	136	1 492	2.75	3.23	0.968	0.967	0.932
	Israel	86	1 359	1.30	2.68	0.973	0.973	0.841
	Italy	561	10 663	2.06	2.52	0.975	0.975	0.863
	Japan	0	0	0.00	1.93	0.981	0.981	0.919
	Korea	16	1 748	0.28	0.69	0.993	0.993	0.879
	Luxembourg	196	270	5.01	8.15	0.919	0.919	0.874
	Mexico	52	1 951	0.15	0.56	0.994	0.994	0.607
	Netherlands	19	648	0.35	3.46	0.965	0.965	0.922
	New Zealand	184	1 793	3.15	4.19	0.958	0.958	0.869
	Norway	207	2 260	3.79	5.93	0.941	0.941	0.906
	Poland	15	1 230	0.27	1.88	0.981	0.981	0.930
	Portugal	115	1 544	1.57	1.57	0.984	0.984	0.837
	Slovak Republic	106	1 516	2.14	4.58	0.954	0.954	0.951
	Slovenia	43	138	0.73	1.61	0.984	0.984	0.924
	Spain	775	12 673	3.17	3.88	0.961	0.961	0.893
	Sweden	146	3 360	2.89	4.75	0.953	0.953	0.931
	Switzerland	209	940	1.15	3.08	0.969	0.969	0.892
	Turkey	11	1 497	0.20	1.19	0.988	0.988	0.566
	United Kingdom	318	17 094	2.44	4.62	0.954	0.954	0.869
	United States	315	170 542	4.81	5.16	0.948	0.948	0.822
Partners	Albania	0	0	0.00	0.87	0.991	0.991	0.614
	Argentina	14	1 225	0.26	0.61	0.994	0.994	0.686
	Azerbaijan	0	0	0.00	1.02	0.990	0.990	0.571
	Brazil	24	2 692	0.13	0.72	0.993	0.993	0.632
	Bulgaria	0	0	0.00	1.94	0.981	0.981	0.721
	Colombia	11	490	0.09	0.16	0.998	0.998	0.585
	Croatia	34	273	0.63	1.78	0.982	0.982	0.888
	Dubai (UAE)	5	7	0.07	1.69	0.983	0.983	0.869
	Hong Kong-China	9	119	0.16	1.19	0.988	0.988	0.889
	Indonesia	0	0	0.00	0.35	0.997	0.950	0.529
	Jordan	24	443	0.42	0.42	0.996	0.996	0.884
	Kazakhstan	82	3 844	1.51	4.21	0.958	0.958	0.890
	Kyrgyzstan	86	1 384	1.73	2.96	0.970	0.948	0.672
	Latvia	19	102	0.43	3.77	0.962	0.962	0.813
	Liechtenstein	0	0	0.00	1.39	0.986	0.986	0.890
	Lithuania	74	632	1.53	2.70	0.973	0.973	0.782
	Macao-China	0	0	0.00	0.05	0.999	0.999	0.797
	Montenegro	0	0	0.00	0.12	0.999	0.999	0.909
	Panama	0	0	0.00	1.15	0.989	0.989	0.527
	Peru	9	558	0.13	0.33	0.997	0.995	0.730
	Qatar	28	28	0.28	1.35	0.986	0.986	0.894
	Romania	0	0	0.00	0.45	0.996	0.996	0.994
	Russian Federation	59	15 247	1.17	2.65	0.973	0.973	0.771
	Serbia	10	133	0.19	2.33	0.977	0.957	0.832
	Shanghai-China	7	130	0.13	1.41	0.986	0.986	0.866
	Singapore	48	417	0.80	1.96	0.980	0.980	0.943
	Chinese Taipei	32	1 662	0.56	1.09	0.989	0.989	0.903
	Thailand	6	458	0.07	1.17	0.988	0.988	0.728
	Trinidad and Tobago	11	36	0.24	0.24	0.998	0.998	0.776
	Tunisia	7	184	0.13	0.13	0.999	0.999	0.887
	Uruguay	14	67	0.20	0.26	0.997	0.997	0.631

Note: For a full explanation of the details in this table please refer to the *PISA 2009 Technical Report* (OECD, forthcoming). The figure for total national population of 15-year-olds enrolled in Column 1 may occasionally be larger than the total number of 15-year-olds in Column 2 due to differing data sources. In Greece, Column 1 does not include immigrants but Column 2 does include immigrants.

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[Part 1/1]

Table A2.2 Exclusions

		Student exclusions (unweighted)						Student exclusion (weighted)					
		Number of excluded students with a disability (Code 1)	Number of excluded students with a disability (Code 2)	Number of excluded students because of language (Code 3)	Number of excluded students for other reasons (Code 4)	Number of excluded students because of no materials available in the language of instruction (Code 5)	Total number of excluded students	Weighted number of excluded students with a disability (Code 1)	Weighted number of excluded students with a disability (Code 2)	Weighted number of excluded students because of language (Code 3)	Weighted number of excluded students for other reasons (Code 4)	Number of excluded students because of no materials available in the language of instruction (Code 5)	Total weighted number of excluded students
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
OECD	Australia	24	210	79	0	0	313	272	2 834	1 283	0	0	4 389
	Austria	0	26	19	0	0	45	0	317	290	0	0	607
	Belgium	3	17	10	0	0	30	26	171	95	0	0	292
	Canada	49	1 458	100	0	0	1 607	428	19 082	1 326	0	0	20 837
	Chile	5	10	0	0	0	15	177	443	0	0	0	620
	Czech Republic	8	7	9	0	0	24	117	144	162	0	0	423
	Denmark	13	182	35	66	0	296	165	1 432	196	656	0	2 448
	Estonia	3	28	1	0	0	32	8	87	2	0	0	97
	Finland	4	48	12	11	2	77	38	447	110	99	23	717
	France	1	0	0	0	0	1	304	0	0	0	0	304
	Germany	6	20	2	0	0	28	864	2 443	285	0	0	3 591
	Greece	7	11	7	117	0	142	172	352	195	2 257	0	2 977
	Hungary	0	1	0	9	0	10	0	48	0	313	0	361
	Iceland	3	78	64	38	1	187	3	78	65	39	1	189
	Ireland	4	72	25	35	0	136	51	783	262	396	0	1 492
	Israel	10	69	7	0	0	86	194	1 049	116	0	0	1 359
	Italy	45	348	168	0	0	561	748	6 241	3 674	0	0	10 663
	Japan	0	0	0	0	0	0	0	0	0	0	0	0
	Korea	7	9	0	0	0	16	994	753	0	0	0	1 748
	Luxembourg	2	132	62	0	0	196	2	206	62	0	0	270
	Mexico	25	25	2	0	0	52	1 010	905	36	0	0	1 951
	Netherlands	6	13	0	0	0	19	178	470	0	0	0	648
	New Zealand	19	84	78	0	3	184	191	824	749	0	29	1 793
	Norway	8	160	39	0	0	207	90	1 756	414	0	0	2 260
	Poland	2	13	0	0	0	15	169	1 061	0	0	0	1 230
	Portugal	2	100	13	0	0	115	25	1 322	197	0	0	1 544
	Slovak Republic	12	37	1	56	0	106	171	558	19	768	0	1 516
	Slovenia	6	10	27	0	0	43	40	32	66	0	0	138
	Spain	45	441	289	0	0	775	1 007	7 141	4 525	0	0	12 673
	Sweden	115	0	31	0	0	146	2 628	0	732	0	0	3 360
	Switzerland	11	106	92	0	0	209	64	344	532	0	0	940
	Turkey	3	3	5	0	0	11	338	495	665	0	0	1 497
	United Kingdom	40	247	31	0	0	318	2 438	13 482	1 174	0	0	17 094
	United States	29	236	40	10	0	315	15 367	127 486	21 718	5 971	0	170 542
Partners	Albania	0	0	0	0	0	0	0	0	0	0	0	0
	Argentina	4	10	0	0	0	14	288	937	0	0	0	1 225
	Azerbaijan	0	0	0	0	0	0	0	0	0	0	0	0
	Brazil	21	3	0	0	0	24	2 495	197	0	0	0	2 692
	Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0
	Colombia	7	2	2	0	0	11	200	48	242	0	0	490
	Croatia	4	30	0	0	0	34	34	239	0	0	0	273
	Dubai (UAE)	1	1	3	0	0	5	2	2	3	0	0	7
	Hong Kong-China	0	9	0	0	0	9	0	119	0	0	0	119
	Indonesia	0	0	0	0	0	0	0	0	0	0	0	0
	Jordan	11	7	6	0	0	24	166	149	127	0	0	443
	Kazakhstan	10	17	0	0	55	82	429	828	0	0	2 587	3 844
	Kyrgyzstan	68	13	5	0	0	86	1 093	211	80	0	0	1 384
	Latvia	6	8	5	0	0	19	25	44	33	0	0	102
	Liechtenstein	0	0	0	0	0	0	0	0	0	0	0	0
	Lithuania	4	69	1	0	0	74	33	590	9	0	0	632
	Macao-China	0	0	0	0	0	0	0	0	0	0	0	0
	Montenegro	0	0	0	0	0	0	0	0	0	0	0	0
	Panama	0	0	0	0	0	0	0	0	0	0	0	0
	Peru	4	5	0	0	0	9	245	313	0	0	0	558
	Qatar	9	18	1	0	0	28	9	18	1	0	0	28
	Romania	0	0	0	0	0	0	0	0	0	0	0	0
	Russian Federation	11	47	1	0	0	59	2 081	13 010	157	0	0	15 247
	Serbia	4	5	0	0	1	10	66	53	0	0	13	133
	Shanghai-China	1	6	0	0	0	7	19	111	0	0	0	130
	Singapore	2	22	24	0	0	48	17	217	182	0	0	417
	Chinese Taipei	13	19	0	0	0	32	684	977	0	0	0	1 662
	Thailand	0	5	1	0	0	6	0	260	198	0	0	458
	Trinidad and Tobago	1	10	0	0	0	11	3	33	0	0	0	36
	Tunisia	4	1	2	0	0	7	104	21	58	0	0	184
	Uruguay	2	9	3	0	0	14	14	34	18	0	0	67

Exclusion codes:
Code 1 Functional disability – student has a moderate to severe permanent physical disability.
Code 2 Intellectual disability – student has a mental or emotional disability and has either been tested as cognitively delayed or is considered in the professional opinion of qualified staff to be cognitively delayed.
Code 3 Limited assessment language proficiency – student is not a native speaker of any of the languages of the assessment in the country and has been resident in the country for less than one year.
Code 4 Other defined by the national centres and approved by the international centre.
Code 5 No materials available in the language of instruction.
Note: For a full explanation of other details in this table, please refer to the *PISA 2009 Technical Report* (OECD, forthcoming).
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- ***Column 12*** shows the **overall exclusion rate**, which represents the weighted percentage of the national desired target population excluded from PISA either through school-level exclusions or through the exclusion of students within schools. It is calculated as the school-level exclusion rate (Column 6 divided by 100) plus within-school exclusion rate (Column 11 divided by 100) multiplied by 1 minus the school-level exclusion rate (Column 6 divided by 100). This result is then multiplied by 100. Five countries, Denmark, Luxembourg, Canada, Norway and the United States, had exclusion rates higher than 5%. When language exclusions were accounted for (*i.e.* removed from the overall exclusion rate), the United States no longer had an exclusion rate greater than 5%.
- ***Column 13*** presents an **index of the extent to which the national desired target population is covered by the PISA sample**. Denmark, Luxembourg, Canada, Norway and the United States were the only countries where the coverage is below 95%.
- ***Column 14*** presents an **index of the extent to which 15-year-olds enrolled in schools are covered by the PISA sample**. The index measures the overall proportion of the national enrolled population that is covered by the non-excluded portion of the student sample. The index takes into account both school-level and student-level exclusions. Values close to 100 indicate that the PISA sample represents the entire education system as defined for PISA 2009. The index is the weighted number of participating students (Column 8) divided by the weighted number of participating and excluded students (Column 8 plus Column 10), times the nationally defined target population (Column 5) divided by the eligible population (Column 2) (times 100).
- ***Column 15*** presents an **index of the coverage of the 15-year-old population**. This index is the weighted number of participating students (Column 8) divided by the total population of 15-year-old students (Column 1).

This high level of coverage contributes to the comparability of the assessment results. For example, even assuming that the excluded students would have systematically scored worse than those who participated, and that this relationship is moderately strong, an exclusion rate in the order of 5% would likely lead to an overestimation of national mean scores of less than 5 score points (on a scale with an international mean of 500 score points and a standard deviation of 100 score points). This assessment is based on the following calculations: if the correlation between the propensity of exclusions and student performance is 0.3, resulting mean scores would likely be overestimated by 1 score point if the exclusion rate is 1%, by 3 score points if the exclusion rate is 5%, and by 6 score points if the exclusion rate is 10%. If the correlation between the propensity of exclusions and student performance is 0.5, resulting mean scores would be overestimated by 1 score point if the exclusion rate is 1%, by 5 score points if the exclusion rate is 5%, and by 10 score points if the exclusion rate is 10%. For this calculation, a model was employed that assumes a bivariate normal distribution for performance and the propensity to participate. For details, see the *PISA 2009 Technical Report* (OECD, forthcoming).

Sampling procedures and response rates

The accuracy of any survey results depends on the quality of the information on which national samples are based as well as on the sampling procedures. Quality standards, procedures, instruments and verification mechanisms were developed for PISA that ensured that national samples yielded comparable data and that the results could be compared with confidence.

Most PISA samples were designed as two-stage stratified samples (where countries applied different sampling designs, these are documented in the *PISA 2009 Technical Report* [OECD, forthcoming]). The first stage consisted of sampling individual schools in which 15-year-old students could be enrolled. Schools were sampled systematically with probabilities proportional to size, the measure of size being a function of the estimated number of eligible (15-year-old) students enrolled. A minimum of 150 schools were selected in each country (where this number existed), although the requirements for national analyses often required a somewhat larger sample. As the schools were sampled, replacement schools were simultaneously identified, in case a sampled school chose not to participate in PISA 2009.

In the case of Iceland, Liechtenstein, Luxembourg, Macao-China and Qatar, all schools and all eligible students within schools were included in the sample.

Experts from the PISA Consortium performed the sample selection process for most participating countries and monitored it closely in those countries that selected their own samples. The second stage of the selection process sampled students within sampled schools. Once schools were selected, a list of each sampled school's 15-year-old students was prepared. From this list, 35 students were then selected with equal probability (all 15-year-old students were selected if fewer than 35 were enrolled). The number of students to be sampled per school could deviate from 35, but could not be less than 20.

Data-quality standards in PISA required minimum participation rates for schools as well as for students. These standards were established to minimise the potential for response biases. In the case of countries meeting these standards, it was likely that any bias resulting from non-response would be negligible, *i.e.* typically smaller than the sampling error.

A minimum response rate of 85% was required for the schools initially selected. Where the initial response rate of schools was between 65 and 85%, however, an acceptable school response rate could still be achieved through the use of replacement schools. This procedure brought with it a risk of increased response bias. Participating countries were, therefore, encouraged to persuade as many of the schools in the original sample as possible to participate. Schools with a student participation rate between 25% and 50% were not regarded as participating schools, but data from these schools were included in the database and contributed to the various estimations. Data from schools with a student participation rate of less than 25% were excluded from the database.

[Part 1/2]

Table A2.3 Response rates

		Initial sample – before school replacement					Final sample – after school replacement		
		Weighted school participation rate before replacement (%)	Weighted number of responding schools (weighted also by enrolment)	Weighted number of schools sampled (responding and non-responding) (weighted also by enrolment)	Number of responding schools (unweighted)	Number of responding and non-responding schools (unweighted)	Weighted school participation rate after replacement (%)	Weighted number of responding schools (weighted also by enrolment)	Weighted number of schools sampled (responding and non-responding) (weighted also by enrolment)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OECD	Australia	97.78	265 659	271 696	342	357	98.85	268 780	271 918
	Austria	93.94	88 551	94 261	280	291	93.94	88 551	94 261
	Belgium	88.76	112 594	126 851	255	292	95.58	121 291	126 899
	Canada	88.04	362 152	411 343	893	1 001	89.64	368 708	411 343
	Chile	94.34	245 583	260 331	189	201	99.04	257 594	260 099
	Czech Republic	83.09	94 696	113 961	226	270	97.40	111 091	114 062
	Denmark	83.94	55 375	65 967	264	325	90.75	59 860	65 964
	Estonia	100.00	13 230	13 230	175	175	100.00	13 230	13 230
	Finland	98.65	62 892	63 751	201	204	100.00	63 748	63 751
	France	94.14	658 769	699 776	166	177	94.14	658 769	699 776
	Germany	98.61	826 579	838 259	223	226	100.00	838 259	838 259
	Greece	98.19	98 710	100 529	181	184	99.40	99 925	100 529
	Hungary	98.21	101 523	103 378	184	190	99.47	103 067	103 618
	Iceland	98.46	4 488	4 558	129	141	98.46	4 488	4 558
	Ireland	87.18	48 821	55 997	139	160	88.44	49 526	55 997
	Israel	92.03	103 141	112 069	170	186	95.40	106 918	112 069
	Italy	94.27	532 432	564 811	1 054	1 108	99.08	559 546	564 768
	Japan	87.77	999 408	1 138 694	171	196	94.99	1 081 662	1 138 694
	Korea	100.00	683 793	683 793	157	157	100.00	683 793	683 793
	Luxembourg	100.00	5 437	5 437	39	39	100.00	5 437	5 437
	Mexico	95.62	1 338 291	1 399 638	1 512	1 560	97.71	1 367 668	1 399 730
	Netherlands	80.40	154 471	192 140	155	194	95.54	183 555	192 118
	New Zealand	84.11	49 917	59 344	148	179	91.00	54 130	59 485
	Norway	89.61	55 484	61 920	183	207	96.53	59 759	61 909
	Poland	88.16	409 513	464 535	159	187	97.70	453 855	464 535
	Portugal	93.61	102 225	109 205	201	216	98.43	107 535	109 251
	Slovak Republic	93.33	67 284	72 092	180	191	99.01	71 388	72 105
	Slovenia	98.36	19 798	20 127	337	352	98.36	19 798	20 127
	Spain	99.53	422 692	424 705	888	892	99.53	422 692	424 705
	Sweden	99.91	120 693	120 802	189	191	99.91	120 693	120 802
	Switzerland	94.25	81 005	85 952	413	429	98.71	84 896	86 006
	Turkey	100.00	849 830	849 830	170	170	100.00	849 830	849 830
	United Kingdom	71.06	523 271	736 341	418	549	87.35	643 027	736 178
	United States	67.83	2 673 852	3 941 908	140	208	77.50	3 065 651	3 955 606
Partners	Albania	97.29	39 168	40 259	177	182	99.37	39 999	40 253
	Argentina	97.18	590 215	607 344	194	199	99.42	603 817	607 344
	Azerbaijan	99.86	168 646	168 890	161	162	100.00	168 890	168 890
	Brazil	93.13	2 435 250	2 614 824	899	976	94.75	2 477 518	2 614 806
	Bulgaria	98.16	56 922	57 991	173	178	99.10	57 823	58 346
	Colombia	90.21	507 649	562 728	260	285	94.90	533 899	562 587
	Croatia	99.19	44 561	44 926	157	159	99.86	44 862	44 926
	Dubai (UAE)	100.00	10 144	10 144	190	190	100.00	10 144	10 144
	Hong Kong-China	69.19	53 800	77 758	108	156	96.75	75 232	77 758
	Indonesia	94.54	2 337 438	2 472 502	172	183	100.00	2 473 528	2 473 528
	Jordan	100.00	105 906	105 906	210	210	100.00	105 906	105 906
	Kazakhstan	100.00	257 427	257 427	199	199	100.00	257 427	257 427
	Kyrgyzstan	98.53	88 412	89 733	171	174	99.47	89 260	89 733
	Latvia	97.46	26 986	27 689	180	185	99.39	27 544	27 713
	Liechtenstein	100.00	356	356	12	12	100.00	356	356
	Lithuania	98.13	41 759	42 555	192	197	99.91	42 526	42 564
	Macao-China	100.00	5 966	5 966	45	45	100.00	5 966	5 966
	Montenegro	100.00	8 527	8 527	52	52	100.00	8 527	8 527
	Panama	82.58	33 384	40 426	180	220	83.76	33 779	40 329
	Peru	100.00	480 640	480 640	240	240	100.00	480 640	480 640
	Qatar	97.30	10 223	10 507	149	154	97.30	10 223	10 507
	Romania	100.00	150 114	150 114	159	159	100.00	150 114	150 114
	Russian Federation	100.00	1 392 765	1 392 765	213	213	100.00	1 392 765	1 392 765
	Serbia	99.21	70 960	71 524	189	191	99.97	71 504	71 524
	Shanghai-China	99.32	98 841	99 514	151	152	100.00	99 514	99 514
	Singapore	96.19	51 552	53 592	168	175	97.88	52 454	53 592
	Chinese Taipei	99.34	322 005	324 141	157	158	100.00	324 141	324 141
	Thailand	98.01	737 225	752 193	225	230	100.00	752 392	752 392
	Trinidad and Tobago	97.21	17 180	17 673	155	160	97.21	17 180	17 673
	Tunisia	100.00	153 198	153 198	165	165	100.00	153 198	153 198
	Uruguay	98.66	42 820	43 400	229	233	98.66	42 820	43 400

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[Part 2/2]

Table A2.3 Response rates

		Final sample – after school replacement		Final sample – students within schools after school replacement				
		Number of responding schools (unweighted)	Number of responding and non-responding schools (unweighted)	Weighted student participation rate after replacement (%)	Number of students assessed (weighted)	Number of students sampled (assessed and absent) (weighted)	Number of students assessed (unweighted)	Number of students sampled (assessed and absent) (unweighted)
		(9)	(10)	(11)	(12)	(13)	(14)	(15)
OECD	Australia	345	357	86.05	205 234	238 498	14 060	16 903
	Austria	280	291	88.63	72 793	82 135	6 568	7 587
	Belgium	275	292	91.38	104 263	114 097	8 477	9 245
	Canada	908	1 001	79.52	257 905	324 342	22 383	27 603
	Chile	199	201	92.88	227 541	244 995	5 663	6 097
	Czech Republic	260	270	90.75	100 685	110 953	6 049	6 656
	Denmark	285	325	89.29	49 236	55 139	5 924	6 827
	Estonia	175	175	94.06	12 208	12 978	4 727	5 023
	Finland	203	204	92.27	56 709	61 460	5 810	6 309
	France	166	177	87.12	556 054	638 284	4 272	4 900
	Germany	226	226	93.93	720 447	766 993	4 979	5 309
	Greece	183	184	95.95	88 875	92 631	4 957	5 165
	Hungary	187	190	93.25	97 923	105 015	4 605	4 956
	Iceland	129	141	83.91	3 635	4 332	3 635	4 332
	Ireland	141	160	83.81	39 248	46 830	3 896	4 654
	Israel	176	186	89.45	88 480	98 918	5 761	6 440
	Italy	1 095	1 108	92.13	462 655	502 190	30 876	33 390
	Japan	185	196	95.32	1 010 801	1 060 382	6 077	6 377
	Korea	157	157	98.76	622 187	630 030	4 989	5 057
	Luxembourg	39	39	95.57	4 897	5 124	4 622	4 833
	Mexico	1 531	1 560	95.13	1 214 827	1 276 982	38 213	40 125
	Netherlands	185	194	89.78	157 912	175 897	4 747	5 286
	New Zealand	161	179	84.65	42 452	50 149	4 606	5 476
	Norway	197	207	89.92	49 785	55 366	4 660	5 194
	Poland	179	187	85.87	376 767	438 739	4 855	5 674
	Portugal	212	216	87.11	83 094	95 386	6 263	7 169
	Slovak Republic	189	191	93.03	63 854	68 634	4 555	4 898
	Slovenia	337	352	90.92	16 777	18 453	6 135	6 735
	Spain	888	892	89.60	345 122	385 164	25 871	28 280
	Sweden	189	191	92.97	105 026	112 972	4 567	4 912
	Switzerland	425	429	93.58	74 712	79 836	11 810	12 551
	Turkey	170	170	97.85	741 029	757 298	4 996	5 108
	United Kingdom	481	549	86.96	520 121	598 110	12 168	14 046
	United States	160	208	86.99	2 298 889	2 642 598	5 165	5 951
Partners	Albania	181	182	95.39	32 347	33 911	4 596	4 831
	Argentina	198	199	88.25	414 166	469 285	4 762	5 423
	Azerbaijan	162	162	99.14	105 095	106 007	4 691	4 727
	Brazil	926	976	89.04	1 767 872	1 985 479	19 901	22 715
	Bulgaria	176	178	97.34	56 096	57 630	4 499	4 617
	Colombia	274	285	92.83	462 602	498 331	7 910	8 483
	Croatia	158	159	93.76	40 321	43 006	4 994	5 326
	Dubai (UAE)	190	190	90.39	8 297	9 179	5 620	6 218
	Hong Kong-China	151	156	93.19	68 142	73 125	4 837	5 195
	Indonesia	183	183	96.91	2 189 287	2 259 118	5 136	5 313
	Jordan	210	210	95.85	99 734	104 056	6 486	6 777
	Kazakhstan	199	199	98.49	246 872	250 657	5 412	5 489
	Kyrgyzstan	173	174	98.04	76 523	78 054	4 986	5 086
	Latvia	184	185	91.27	21 241	23 273	4 502	4 930
	Liechtenstein	12	12	92.68	329	355	329	355
	Lithuania	196	197	93.36	37 808	40 495	4 528	4 854
	Macao-China	45	45	99.57	5 952	5 978	5 952	5 978
	Montenegro	52	52	95.43	7 375	7 728	4 825	5 062
	Panama	183	220	88.67	22 666	25 562	3 913	4 449
	Peru	240	240	96.35	412 011	427 607	5 985	6 216
	Qatar	149	154	93.63	8 990	9 602	8 990	9 602
	Romania	159	159	99.47	150 331	151 130	4 776	4 803
	Russian Federation	213	213	96.77	1 248 353	1 290 047	5 308	5 502
	Serbia	190	191	95.37	67 496	70 775	5 522	5 804
	Shanghai-China	152	152	98.89	95 966	97 045	5 115	5 175
	Singapore	171	175	91.04	46 224	50 775	5 283	5 809
	Chinese Taipei	158	158	95.30	283 239	297 203	5 831	6 108
	Thailand	230	230	97.37	673 688	691 916	6 225	6 396
	Trinidad and Tobago	155	160	85.92	12 275	14 287	4 731	5 518
	Tunisia	165	165	96.93	132 354	136 545	4 955	5 113
	Uruguay	229	233	87.03	29 193	33 541	5 924	6 815

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PISA 2009 also required a minimum participation rate of 80% of students within participating schools. This minimum participation rate had to be met at the national level, not necessarily by each participating school. Follow-up sessions were required in schools in which too few students had participated in the original assessment sessions. Student participation rates were calculated over all original schools, and also over all schools, whether original sample or replacement schools, and from the participation of students in both the original assessment and any follow-up sessions. A student who participated in the original or follow-up cognitive sessions was regarded as a participant. Those who attended only the questionnaire session were included in the international database and contributed to the statistics presented in this publication if they provided at least a description of their father's or mother's occupation.

Table A2.3 shows the response rates for students and schools, before and after replacement.

- ***Column 1*** shows the **weighted participation rate of schools before replacement**. This is obtained by dividing Column 2 by Column 3.
- ***Column 2*** shows the **weighted number of responding schools before school replacement** (weighted by student enrolment).
- ***Column 3*** shows the **weighted number of sampled schools before school replacement** (including both responding and non-responding schools, weighted by student enrolment).
- ***Column 4*** shows the unweighted number **of responding schools before school replacement**.
- ***Column 5*** shows the unweighted **number of responding and non-responding schools before school replacement**.
- ***Column 6*** shows the **weighted participation rate of schools after replacement**. This is obtained by dividing Column 7 by Column 8.
- ***Column 7*** shows the **weighted number of responding schools after school replacement** (weighted by student enrolment).
- ***Column 8*** shows the **weighted number of schools sampled after school replacement** (including both responding and non-responding schools, weighted by student enrolment).
- ***Column 9*** shows the unweighted number of responding schools after school replacement.
- ***Column 10*** shows the unweighted number of responding and non-responding schools after school replacement.
- ***Column 11*** shows the **weighted student participation rate after replacement**. This is obtained by dividing Column 12 by Column 13.
- ***Column 12*** shows the **weighted number of students assessed**.
- ***Column 13*** shows the **weighted number of students sampled** (including both students who were assessed and students who were absent on the day of the assessment).
- ***Column 14*** shows the **unweighted number of students assessed.** Note that any students in schools with student-response rates less than 50% were not included in these rates (both weighted and unweighted).
- ***Column 15*** shows the **unweighted number of students sampled** (including both students that were assessed and students who were absent on the day of the assessment). Note that any students in schools where fewer than half of the eligible students were assessed were not included in these rates (neither weighted nor unweighted).

Definition of schools

In some countries, sub-units within schools were sampled instead of schools and this may affect the estimation of the between-school variance components. In Austria, the Czech Republic, Germany, Hungary, Japan, Romania and Slovenia, schools with more than one study programme were split into the units delivering these programmes. In the Netherlands, for schools with both lower and upper secondary programmes, schools were split into units delivering each programme level. In the Flemish Community of Belgium, in the case of multi-campus schools, implantations (campuses) were sampled, whereas in the French Community, in the case of multi-campus schools, the larger administrative units were sampled. In Australia, for schools with more than one campus, the individual campuses were listed for sampling. In Argentina, Croatia and Dubai (UAE), schools that had more than one campus had the locations listed for sampling. In Spain, the schools in the Basque region with multi-linguistic models were split into linguistic models for sampling.

Grade levels

Students assessed in PISA 2009 are at various grade levels. The percentage of students at each grade level is presented by country in Table A2.4a and by gender within each country in Table A2.4b.

[Part 1/1]

Table A2.4a Percentage of students at each grade level

		Grade level											
		7th grade		8th grade		9th grade		10th grade		11th grade		12th grade	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	0.0	(0.0)	0.1	(0.0)	10.4	(0.6)	70.8	(0.6)	18.6	(0.6)	0.1	(0.0)
	Austria	0.7	(0.2)	6.2	(1.0)	42.4	(0.9)	50.7	(1.0)	0.0	(0.0)	0.0	c
	Belgium	0.4	(0.2)	5.5	(0.5)	32.0	(0.6)	60.8	(0.7)	1.2	(0.1)	0.0	(0.0)
	Canada	0.0	(0.0)	1.2	(0.2)	13.6	(0.5)	84.1	(0.5)	1.1	(0.1)	0.0	(0.0)
	Chile	1.0	(0.2)	3.9	(0.5)	20.5	(0.8)	69.4	(1.0)	5.2	(0.3)	0.0	(0.0)
	Czech Republic	0.5	(0.2)	3.8	(0.3)	48.9	(1.0)	46.7	(1.1)	0.0	c	0.0	c
	Denmark	0.1	(0.0)	14.7	(0.6)	83.5	(0.8)	1.7	(0.5)	0.0	c	0.0	c
	Estonia	1.6	(0.3)	24.0	(0.7)	72.4	(0.9)	1.8	(0.3)	0.1	(0.1)	0.0	c
	Finland	0.5	(0.1)	11.8	(0.5)	87.3	(0.5)	0.0	c	0.4	(0.1)	0.0	c
	France	1.3	(0.9)	3.6	(0.7)	34.4	(1.2)	56.6	(1.5)	4.0	(0.7)	0.1	(0.0)
	Germany	1.2	(0.2)	11.0	(0.5)	54.8	(0.8)	32.5	(0.8)	0.4	(0.1)	0.0	(0.0)
	Greece	0.4	(0.2)	1.4	(0.5)	5.5	(0.8)	92.7	(1.0)	0.0	c	0.0	c
	Hungary	2.8	(0.6)	7.6	(1.1)	67.1	(1.4)	22.4	(0.9)	0.1	(0.1)	0.0	(0.0)
	Iceland	0.0	c	0.0	c	0.0	(0.0)	98.3	(0.1)	1.7	(0.1)	0.0	c
	Ireland	0.1	(0.0)	2.4	(0.3)	59.1	(1.0)	24.0	(1.4)	14.4	(1.1)	0.0	c
	Israel	0.0	c	0.3	(0.1)	17.9	(1.0)	81.3	(1.0)	0.5	(0.2)	0.0	(0.0)
	Italy	0.1	(0.1)	1.4	(0.3)	16.9	(0.4)	78.4	(0.6)	3.2	(0.3)	0.0	c
	Japan	0.0	c	0.0	c	0.0	c	100.0	(0.0)	0.0	c	0.0	c
	Korea	0.0	c	0.0	(0.0)	4.2	(0.9)	95.1	(0.9)	0.7	(0.1)	0.0	c
	Luxembourg	0.6	(0.1)	11.6	(0.2)	51.6	(0.3)	36.0	(0.2)	0.3	(0.0)	0.0	c
	Mexico	1.7	(0.1)	7.4	(0.3)	34.5	(0.8)	55.6	(0.9)	0.7	(0.2)	0.0	(0.0)
	Netherlands	0.2	(0.2)	2.7	(0.3)	46.2	(1.1)	50.5	(1.1)	0.5	(0.1)	0.0	c
	New Zealand	0.0	c	0.0	c	0.0	(0.0)	5.9	(0.4)	88.8	(0.5)	5.3	(0.3)
	Norway	0.0	c	0.0	c	0.5	(0.1)	99.3	(0.2)	0.2	(0.1)	0.0	c
	Poland	1.0	(0.2)	4.5	(0.4)	93.6	(0.6)	0.9	(0.3)	0.0	c	0.0	c
	Portugal	2.3	(0.3)	9.0	(0.8)	27.9	(1.6)	60.4	(2.2)	0.4	(0.1)	0.0	c
	Slovak Republic	1.0	(0.2)	2.6	(0.3)	35.7	(1.4)	56.9	(1.6)	3.8	(0.8)	0.0	(0.0)
	Slovenia	0.0	c	0.1	(0.1)	3.0	(0.7)	90.7	(0.7)	6.2	(0.2)	0.0	c
	Spain	0.1	(0.0)	9.9	(0.4)	26.5	(0.6)	63.4	(0.7)	0.0	(0.0)	0.0	c
	Sweden	0.1	(0.1)	3.2	(0.3)	95.1	(0.6)	1.6	(0.5)	0.0	c	0.0	c
	Switzerland	0.6	(0.1)	15.5	(0.9)	61.7	(1.3)	21.0	(1.1)	1.2	(0.5)	0.0	(0.0)
	Turkey	0.7	(0.1)	3.5	(0.8)	25.2	(1.3)	66.6	(1.5)	3.8	(0.3)	0.2	(0.1)
	United Kingdom	0.0	c	0.0	c	0.0	c	1.2	(0.1)	98.0	(0.1)	0.8	(0.0)
	United States	0.0	c	0.1	(0.1)	10.9	(0.8)	68.5	(1.0)	20.3	(0.7)	0.1	(0.1)
	OECD average	0.8	(0.1)	5.8	(0.1)	37.0	(0.2)	52.9	(0.2)	9.9	(0.1)	0.5	(0.0)
Partners	Albania	0.4	(0.1)	2.2	(0.3)	50.9	(2.0)	46.4	(2.0)	0.1	(0.0)	0.0	c
	Argentina	4.7	(0.9)	12.9	(1.3)	20.4	(1.2)	57.8	(2.1)	4.3	(0.5)	0.0	c
	Azerbaijan	0.6	(0.2)	5.3	(0.5)	49.4	(1.3)	44.3	(1.3)	0.4	(0.1)	0.0	c
	Brazil	6.8	(0.4)	18.0	(0.7)	37.5	(0.8)	35.7	(0.8)	2.1	(0.1)	0.0	c
	Bulgaria	1.5	(0.3)	6.1	(0.6)	88.7	(0.9)	3.8	(0.6)	0.0	c	0.0	c
	Colombia	4.4	(0.5)	10.3	(0.7)	22.1	(0.8)	42.3	(1.0)	21.0	(1.0)	0.0	c
	Croatia	0.0	c	0.2	(0.2)	77.5	(0.4)	22.3	(0.4)	0.0	c	0.0	c
	Dubai (UAE)	1.1	(0.1)	3.4	(0.1)	14.8	(0.4)	56.9	(0.5)	22.9	(0.4)	0.9	(0.1)
	Hong Kong-China	1.7	(0.2)	7.2	(0.5)	25.2	(0.5)	65.9	(0.9)	0.1	(0.0)	0.0	c
	Indonesia	1.5	(0.5)	6.5	(0.8)	46.0	(3.1)	40.5	(3.2)	5.0	(0.8)	0.5	(0.4)
	Jordan	0.1	(0.1)	1.3	(0.2)	7.0	(0.5)	91.6	(0.6)	0.0	c	0.0	c
	Kazakhstan	0.4	(0.1)	6.4	(0.4)	73.3	(1.9)	19.7	(2.0)	0.1	(0.0)	0.0	c
	Kyrgyzstan	0.2	(0.1)	7.9	(0.5)	71.4	(1.3)	19.8	(1.4)	0.7	(0.1)	0.0	c
	Latvia	2.7	(0.5)	15.5	(0.7)	79.4	(0.9)	2.4	(0.3)	0.1	(0.1)	0.0	(0.0)
	Liechtenstein	0.8	(0.5)	17.5	(1.1)	71.3	(0.8)	10.4	(1.0)	0.0	c	0.0	c
	Lithuania	0.5	(0.1)	10.2	(0.9)	80.9	(0.8)	8.4	(0.6)	0.0	(0.0)	0.0	c
	Macao-China	6.7	(0.1)	19.2	(0.2)	34.9	(0.1)	38.7	(0.1)	0.5	(0.1)	0.0	c
	Montenegro	0.0	c	2.5	(1.7)	82.7	(1.5)	14.8	(0.3)	0.0	c	0.0	c
	Panama	2.9	(0.8)	10.6	(1.6)	30.6	(3.3)	49.8	(4.5)	6.1	(1.4)	0.0	c
	Peru	4.0	(0.4)	8.9	(0.6)	17.1	(0.7)	44.6	(1.1)	25.4	(0.8)	0.0	c
	Qatar	1.7	(0.1)	3.6	(0.1)	13.5	(0.2)	62.6	(0.2)	18.2	(0.2)	0.4	(0.1)
	Romania	0.0	c	7.2	(1.0)	88.6	(1.1)	4.3	(0.6)	0.0	c	0.0	c
	Russian Federation	0.9	(0.2)	10.0	(0.7)	60.1	(1.8)	28.1	(1.6)	0.9	(0.2)	0.0	c
	Serbia	0.2	(0.1)	2.1	(0.5)	96.0	(0.6)	1.7	(0.2)	0.0	c	0.0	c
	Shanghai-China	1.0	(0.2)	4.1	(0.4)	37.4	(0.8)	57.1	(0.9)	0.4	(0.2)	0.0	(0.0)
	Singapore	1.0	(0.2)	2.6	(0.2)	34.7	(0.4)	61.6	(0.3)	0.0	c	0.0	(0.0)
	Chinese Taipei	0.0	c	0.1	(0.0)	34.4	(0.9)	65.5	(0.9)	0.0	(0.0)	0.0	c
	Thailand	0.1	(0.0)	0.5	(0.1)	23.2	(1.1)	73.5	(1.1)	2.7	(0.4)	0.0	c
	Trinidad and Tobago	2.1	(0.2)	8.8	(0.4)	25.3	(0.4)	56.1	(0.4)	7.7	(0.3)	0.0	c
	Tunisia	6.4	(0.4)	13.4	(0.6)	23.9	(0.9)	50.9	(1.4)	5.4	(0.4)	0.0	c
	Uruguay	7.1	(0.8)	10.6	(0.6)	21.5	(0.8)	56.2	(1.1)	4.6	(0.4)	0.0	c

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[Part 1/2]

Table A2.4b Percentage of students at each grade level, by gender

		Boys – Grade level											
		7th grade		8th grade		9th grade		10th grade		11th grade		12th grade	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	0.0	c	0.1	(0.0)	13.1	(0.9)	69.6	(1.1)	17.1	(0.8)	0.1	(0.0)
	Austria	0.7	(0.2)	7.4	(1.2)	42.6	(1.3)	49.3	(1.3)	0.0	(0.0)	0.0	c
	Belgium	0.6	(0.2)	6.4	(0.7)	34.6	(0.9)	57.3	(1.0)	1.1	(0.2)	0.0	(0.0)
	Canada	0.0	(0.0)	1.4	(0.3)	14.6	(0.6)	82.9	(0.6)	1.1	(0.1)	0.0	(0.0)
	Chile	1.3	(0.3)	4.9	(0.6)	23.2	(1.0)	65.9	(1.3)	4.7	(0.3)	0.0	c
	Czech Republic	0.7	(0.2)	4.5	(0.5)	52.5	(2.2)	42.3	(2.4)	0.0	c	0.0	c
	Denmark	0.1	(0.0)	19.5	(0.9)	79.5	(1.0)	0.8	(0.3)	0.0	c	0.0	c
	Estonia	2.4	(0.5)	27.0	(1.0)	69.6	(1.1)	1.0	(0.3)	0.0	c	0.0	c
	Finland	0.6	(0.2)	14.0	(0.8)	85.2	(0.8)	0.0	c	0.2	(0.1)	0.0	c
	France	1.3	(0.9)	4.0	(0.6)	39.6	(1.5)	51.4	(1.9)	3.6	(0.8)	0.0	(0.0)
	Germany	1.4	(0.3)	13.1	(0.7)	56.1	(1.0)	28.8	(0.9)	0.6	(0.1)	0.0	c
	Greece	0.5	(0.2)	1.9	(0.5)	6.2	(1.2)	91.4	(1.5)	0.0	c	0.0	c
	Hungary	3.2	(0.8)	9.3	(1.3)	68.8	(1.6)	18.7	(0.9)	0.0	(0.0)	0.0	(0.0)
	Iceland	0.0	c	0.0	c	0.0	c	98.7	(0.2)	1.3	(0.2)	0.0	c
	Ireland	0.1	(0.0)	2.8	(0.5)	60.9	(1.3)	22.4	(1.5)	13.8	(1.4)	0.0	c
	Israel	0.0	c	0.5	(0.2)	19.9	(1.1)	78.7	(1.2)	1.0	(0.4)	0.0	c
	Italy	0.1	(0.1)	1.7	(0.4)	20.1	(0.6)	75.7	(0.7)	2.5	(0.3)	0.0	c
	Japan	0.0	c	0.0	c	0.0	c	100.0	(0.0)	0.0	c	0.0	c
	Korea	0.0	c	0.1	(0.1)	4.7	(1.3)	94.5	(1.4)	0.7	(0.2)	0.0	c
	Luxembourg	0.8	(0.2)	12.5	(0.4)	52.4	(0.5)	34.0	(0.4)	0.3	(0.1)	0.0	c
	Mexico	2.0	(0.2)	8.8	(0.5)	37.6	(0.9)	51.0	(0.9)	0.5	(0.2)	0.0	c
	Netherlands	0.4	(0.3)	3.0	(0.4)	48.9	(1.3)	47.3	(1.3)	0.3	(0.1)	0.0	c
	New Zealand	0.0	c	0.0	c	0.0	c	6.9	(0.5)	87.9	(0.6)	5.2	(0.5)
	Norway	0.0	c	0.0	c	0.5	(0.1)	99.2	(0.2)	0.3	(0.2)	0.0	c
	Poland	1.5	(0.3)	6.5	(0.6)	91.6	(0.7)	0.5	(0.2)	0.0	c	0.0	c
	Portugal	3.4	(0.5)	10.5	(0.9)	30.9	(2.0)	54.9	(2.6)	0.4	(0.1)	0.0	c
	Slovak Republic	1.4	(0.3)	3.7	(0.5)	40.1	(1.9)	51.6	(2.1)	3.3	(0.7)	0.0	c
	Slovenia	0.0	c	0.1	(0.1)	4.0	(1.2)	91.1	(1.2)	4.7	(0.4)	0.0	c
	Spain	0.1	(0.0)	12.2	(0.6)	28.7	(0.8)	58.9	(0.9)	0.0	(0.0)	0.0	c
	Sweden	0.0	(0.0)	4.1	(0.4)	94.7	(0.6)	1.1	(0.3)	0.0	c	0.0	c
	Switzerland	0.8	(0.2)	18.0	(1.2)	60.7	(1.8)	19.4	(1.8)	1.0	(0.4)	0.1	(0.1)
	Turkey	1.0	(0.2)	4.0	(0.9)	30.2	(1.4)	61.3	(1.7)	3.2	(0.3)	0.2	(0.1)
	United Kingdom	0.0	c	0.0	c	0.0	c	1.3	(0.2)	98.0	(0.2)	0.7	(0.1)
	United States	0.0	c	0.1	(0.0)	13.2	(1.0)	68.6	(1.4)	17.9	(0.9)	0.1	(0.1)
	OECD average	1.0	(0.1)	7.0	(0.1)	40.8	(0.2)	50.8	(0.2)	9.8	(0.1)	0.7	(0.0)
Partners	Albania	0.5	(0.2)	2.6	(0.4)	54.0	(2.0)	42.9	(2.1)	0.0	(0.0)	0.0	c
	Argentina	5.9	(1.1)	15.4	(1.4)	22.7	(1.5)	52.5	(2.4)	3.5	(0.5)	0.0	c
	Azerbaijan	0.6	(0.2)	4.7	(0.5)	47.8	(1.4)	46.5	(1.5)	0.3	(0.1)	0.0	c
	Brazil	8.4	(0.6)	21.0	(0.9)	37.8	(0.8)	31.1	(0.9)	1.7	(0.2)	0.0	c
	Bulgaria	2.0	(0.4)	7.4	(0.9)	86.9	(1.2)	3.7	(0.6)	0.0	c	0.0	c
	Colombia	5.5	(0.9)	11.5	(0.9)	21.9	(1.1)	42.4	(1.4)	18.7	(1.2)	0.0	c
	Croatia	0.0	c	0.1	(0.1)	79.1	(0.6)	20.7	(0.6)	0.0	c	0.0	c
	Dubai (UAE)	1.6	(0.2)	4.5	(0.3)	16.0	(0.6)	53.6	(0.7)	23.1	(0.6)	1.1	(0.2)
	Hong Kong-China	1.9	(0.3)	7.3	(0.6)	26.6	(0.7)	64.1	(1.0)	0.1	(0.1)	0.0	c
	Indonesia	1.8	(0.7)	8.2	(1.0)	49.3	(3.4)	36.2	(3.6)	4.0	(0.9)	0.5	(0.3)
	Jordan	0.1	(0.1)	1.2	(0.4)	7.5	(0.8)	91.2	(0.9)	0.0	c	0.0	c
	Kazakhstan	0.5	(0.1)	7.1	(0.6)	75.2	(2.2)	17.2	(2.3)	0.1	(0.0)	0.0	c
	Kyrgyzstan	0.2	(0.1)	8.9	(0.7)	72.9	(1.6)	17.4	(1.6)	0.5	(0.2)	0.0	c
	Latvia	3.6	(0.9)	19.9	(1.1)	74.7	(1.4)	1.6	(0.4)	0.1	(0.1)	0.0	(0.0)
	Liechtenstein	1.1	(0.7)	19.7	(1.6)	68.9	(1.2)	10.3	(1.2)	0.0	c	0.0	c
	Lithuania	0.6	(0.2)	12.3	(1.2)	80.0	(1.2)	7.2	(0.7)	0.0	c	0.0	c
	Macao-China	8.9	(0.2)	22.0	(0.2)	34.9	(0.2)	33.6	(0.2)	0.5	(0.1)	0.0	c
	Montenegro	0.0	c	3.0	(2.0)	85.0	(1.8)	12.0	(0.4)	0.0	c	0.0	c
	Panama	3.4	(1.1)	13.6	(2.5)	32.6	(4.4)	45.7	(5.5)	4.7	(1.8)	0.0	c
	Peru	4.9	(0.5)	11.2	(0.8)	18.8	(1.0)	42.3	(1.4)	22.9	(0.9)	0.0	c
	Qatar	1.9	(0.1)	4.3	(0.2)	14.8	(0.3)	60.4	(0.3)	18.2	(0.2)	0.4	(0.1)
	Romania	0.0	c	6.3	(1.1)	89.9	(1.3)	3.9	(0.7)	0.0	c	0.0	c
	Russian Federation	1.4	(0.3)	10.4	(0.9)	61.2	(1.9)	26.3	(1.9)	0.8	(0.2)	0.0	c
	Serbia	0.3	(0.1)	2.7	(0.7)	95.6	(0.8)	1.4	(0.2)	0.0	c	0.0	c
	Shanghai-China	1.2	(0.3)	5.1	(0.6)	38.8	(1.2)	54.7	(1.4)	0.2	(0.1)	0.0	c
	Singapore	0.8	(0.2)	2.9	(0.3)	35.7	(0.6)	60.6	(0.5)	0.0	c	0.0	c
	Chinese Taipei	0.0	c	0.2	(0.1)	35.2	(1.5)	64.7	(1.5)	0.0	c	0.0	c
	Thailand	0.2	(0.1)	0.8	(0.2)	26.3	(1.4)	70.5	(1.4)	2.2	(0.5)	0.0	c
	Trinidad and Tobago	2.7	(0.3)	10.7	(0.5)	28.4	(0.6)	51.0	(0.5)	7.1	(0.4)	0.0	c
	Tunisia	8.9	(0.6)	16.8	(0.9)	24.4	(1.1)	45.3	(1.5)	4.7	(0.5)	0.0	c
	Uruguay	9.1	(1.0)	12.0	(0.8)	24.9	(0.8)	50.4	(1.3)	3.6	(0.4)	0.0	c

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[Part 2/2]

Table A2.4b Percentage of students at each grade level, by gender

		Girls – Grade level											
		7th grade		8th grade		9th grade		10th grade		11th grade		12th grade	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	0.0	(0.0)	0.1	(0.0)	7.9	(0.5)	72.0	(0.8)	20.0	(0.8)	0.1	(0.0)
	Austria	0.6	(0.4)	5.0	(1.2)	42.2	(1.4)	52.1	(1.5)	0.0	(0.0)	0.0	c
	Belgium	0.3	(0.1)	4.5	(0.5)	29.3	(1.1)	64.5	(1.1)	1.3	(0.2)	0.0	(0.0)
	Canada	0.0	(0.0)	1.0	(0.2)	12.5	(0.5)	85.3	(0.5)	1.1	(0.1)	0.0	(0.0)
	Chile	0.7	(0.1)	2.9	(0.5)	17.7	(0.9)	73.0	(1.1)	5.6	(0.4)	0.0	(0.0)
	Czech Republic	0.3	(0.2)	3.1	(0.4)	44.8	(1.9)	51.8	(1.9)	0.0	c	0.0	c
	Denmark	0.1	(0.0)	10.0	(0.7)	87.3	(0.9)	2.5	(0.8)	0.0	c	0.0	c
	Estonia	0.9	(0.3)	20.8	(0.9)	75.4	(1.1)	2.7	(0.5)	0.2	(0.2)	0.0	c
	Finland	0.4	(0.1)	9.6	(0.6)	89.4	(0.6)	0.0	c	0.6	(0.2)	0.0	c
	France	1.3	(0.9)	3.2	(0.9)	29.4	(1.5)	61.6	(1.7)	4.4	(0.8)	0.1	(0.1)
	Germany	1.1	(0.2)	8.8	(0.6)	53.4	(1.1)	36.4	(1.1)	0.3	(0.1)	0.0	(0.0)
	Greece	0.2	(0.2)	0.9	(0.5)	4.9	(0.7)	94.0	(0.9)	0.0	c	0.0	c
	Hungary	2.3	(0.7)	5.9	(1.1)	65.4	(1.6)	26.2	(1.2)	0.2	(0.1)	0.0	c
	Iceland	0.0	c	0.0	c	0.0	(0.1)	97.9	(0.2)	2.1	(0.2)	0.0	c
	Ireland	0.1	(0.1)	2.0	(0.4)	57.3	(1.5)	25.7	(2.0)	15.1	(1.5)	0.0	c
	Israel	0.0	c	0.1	(0.1)	15.9	(1.0)	83.8	(1.1)	0.2	(0.1)	0.0	(0.0)
	Italy	0.2	(0.1)	1.0	(0.2)	13.5	(0.6)	81.4	(0.7)	3.9	(0.3)	0.0	c
	Japan	0.0	c	0.0	c	0.0	c	100.0	(0.0)	0.0	c	0.0	c
	Korea	0.0	c	0.0	c	3.6	(1.0)	95.6	(1.0)	0.8	(0.1)	0.0	c
	Luxembourg	0.4	(0.1)	10.6	(0.3)	50.8	(0.4)	38.0	(0.3)	0.2	(0.1)	0.0	c
	Mexico	1.5	(0.2)	6.1	(0.4)	31.5	(0.9)	60.1	(1.0)	0.8	(0.3)	0.0	(0.0)
	Netherlands	0.1	(0.1)	2.3	(0.4)	43.4	(1.4)	53.5	(1.3)	0.7	(0.2)	0.0	c
	New Zealand	0.0	c	0.0	c	0.1	(0.1)	4.8	(0.5)	89.8	(0.6)	5.4	(0.5)
	Norway	0.0	c	0.0	c	0.4	(0.1)	99.4	(0.2)	0.1	(0.1)	0.0	c
	Poland	0.6	(0.2)	2.5	(0.3)	95.6	(0.7)	1.3	(0.6)	0.0	c	0.0	c
	Portugal	1.4	(0.2)	7.7	(0.8)	25.1	(1.4)	65.4	(1.9)	0.4	(0.1)	0.0	c
	Slovak Republic	0.7	(0.2)	1.5	(0.3)	31.4	(1.8)	62.1	(2.1)	4.3	(0.9)	0.0	(0.0)
	Slovenia	0.0	c	0.0	c	1.9	(0.7)	90.3	(0.8)	7.8	(0.5)	0.0	c
	Spain	0.1	(0.1)	7.6	(0.4)	24.2	(0.7)	68.0	(0.8)	0.0	(0.0)	0.0	c
	Sweden	0.1	(0.1)	2.3	(0.3)	95.4	(0.7)	2.2	(0.7)	0.0	c	0.0	c
	Switzerland	0.4	(0.1)	12.9	(0.9)	62.6	(1.8)	22.7	(2.0)	1.4	(0.6)	0.0	c
	Turkey	0.4	(0.2)	2.9	(0.8)	19.8	(1.3)	72.3	(1.6)	4.4	(0.4)	0.2	(0.1)
	United Kingdom	0.0	c	0.0	c	0.0	c	1.0	(0.1)	98.1	(0.1)	0.9	(0.1)
	United States	0.0	c	0.2	(0.2)	8.5	(0.7)	68.4	(1.1)	22.8	(1.0)	0.1	(0.1)
	OECD average	0.6	(0.1)	5.0	(0.1)	35.6	(0.2)	55.0	(0.2)	10.2	(0.1)	0.5	(0.0)
Partners	Albania	0.2	(0.1)	1.8	(0.4)	47.6	(2.3)	50.2	(2.3)	0.2	(0.1)	0.0	c
	Argentina	3.6	(0.9)	10.7	(1.5)	18.4	(1.2)	62.3	(2.2)	4.9	(0.6)	0.0	c
	Azerbaijan	0.6	(0.3)	5.8	(0.6)	51.0	(1.5)	42.1	(1.4)	0.4	(0.1)	0.0	c
	Brazil	5.4	(0.4)	15.3	(0.6)	37.1	(0.9)	39.7	(0.9)	2.5	(0.2)	0.0	c
	Bulgaria	0.9	(0.3)	4.6	(0.7)	90.6	(1.0)	3.9	(0.7)	0.0	c	0.0	c
	Colombia	3.3	(0.4)	9.1	(0.8)	22.4	(1.0)	42.2	(1.1)	23.0	(1.1)	0.0	c
	Croatia	0.0	c	0.2	(0.2)	75.8	(0.6)	24.1	(0.5)	0.0	c	0.0	c
	Dubai (UAE)	0.6	(0.1)	2.2	(0.2)	13.5	(0.5)	60.4	(0.6)	22.7	(0.7)	0.6	(0.1)
	Hong Kong-China	1.5	(0.2)	7.1	(0.6)	23.5	(0.6)	67.9	(1.0)	0.0	c	0.0	c
	Indonesia	1.2	(0.3)	4.9	(0.8)	42.7	(3.7)	44.6	(3.8)	6.0	(1.1)	0.6	(0.5)
	Jordan	0.1	(0.0)	1.3	(0.3)	6.5	(0.7)	92.1	(0.9)	0.0	c	0.0	c
	Kazakhstan	0.4	(0.1)	5.7	(0.5)	71.5	(2.0)	22.3	(2.1)	0.2	(0.1)	0.0	c
	Kyrgyzstan	0.1	(0.1)	7.1	(0.6)	69.9	(1.5)	22.0	(1.6)	0.9	(0.2)	0.0	c
	Latvia	1.7	(0.4)	11.2	(0.6)	83.9	(0.8)	3.1	(0.4)	0.1	(0.1)	0.0	c
	Liechtenstein	0.6	(0.6)	15.0	(1.5)	74.0	(1.2)	10.4	(1.6)	0.0	c	0.0	c
	Lithuania	0.3	(0.1)	8.1	(0.8)	81.9	(0.9)	9.6	(0.7)	0.0	(0.0)	0.0	c
	Macao-China	4.4	(0.1)	16.3	(0.2)	34.9	(0.2)	43.9	(0.2)	0.5	(0.1)	0.0	c
	Montenegro	0.0	c	2.0	(1.4)	80.3	(1.3)	17.8	(0.4)	0.0	c	0.0	c
	Panama	2.4	(0.6)	7.7	(1.1)	28.7	(3.0)	53.8	(4.0)	7.5	(1.6)	0.0	c
	Peru	3.2	(0.4)	6.5	(0.6)	15.4	(0.8)	47.0	(1.2)	27.9	(1.2)	0.0	c
	Qatar	1.4	(0.1)	3.0	(0.1)	12.1	(0.2)	64.9	(0.2)	18.1	(0.2)	0.5	(0.1)
	Romania	0.0	c	8.1	(1.5)	87.3	(1.5)	4.7	(0.6)	0.0	c	0.0	c
	Russian Federation	0.5	(0.1)	9.7	(0.8)	59.0	(2.0)	29.8	(1.8)	1.0	(0.2)	0.0	c
	Serbia	0.1	(0.1)	1.4	(0.5)	96.4	(0.6)	2.0	(0.2)	0.0	c	0.0	c
	Shanghai-China	0.8	(0.2)	3.0	(0.4)	36.1	(1.0)	59.5	(1.0)	0.6	(0.2)	0.0	(0.0)
	Singapore	1.2	(0.2)	2.3	(0.3)	33.7	(0.5)	62.7	(0.4)	0.0	c	0.0	(0.0)
	Chinese Taipei	0.0	c	0.0	(0.0)	33.7	(1.5)	66.3	(1.5)	0.0	(0.0)	0.0	c
	Thailand	0.0	c	0.3	(0.1)	20.9	(1.4)	75.8	(1.4)	3.0	(0.4)	0.0	c
	Trinidad and Tobago	1.5	(0.3)	6.9	(0.5)	22.3	(0.6)	61.0	(0.6)	8.3	(0.4)	0.0	c
	Tunisia	4.2	(0.4)	10.3	(0.5)	23.4	(1.0)	56.1	(1.4)	6.0	(0.5)	0.0	c
	Uruguay	5.4	(0.6)	9.4	(0.5)	18.5	(0.9)	61.4	(1.2)	5.4	(0.6)	0.0	c

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Students in or out of the regular education system in Argentina

The low performance of 15-year-old students in Argentina is, to some extent, influenced by a fairly large proportion of 15-year-olds enrolled in programmes outside the regular education system. Table A2.5 shows the proportion of students inside and outside the regular education system, alongside their performance in PISA 2009.

Table A2.5 Percentage of students and mean scores in reading, mathematics and science, according to whether students are in or out of the regular education system in Argentina

	Percentage of students		Mean performance					
			Reading		Mathematics		Science	
	%	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Students in the regular educational system[1]	60.9	2.2	439	5.1	421	4.8	439	4.9
Students out of the regular educational system[2]	39.1	2.2	335	8.0	337	6.7	341	8.3

1. Students who are not in grade 10 or 11 and in programme 3, 4, 5, 6, 7 or 8.
2. Students who are in grade 10 or 11 and in programme 3, 4, 5, 6, 7 or 8.

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ANNEX A3

STANDARD ERRORS, SIGNIFICANCE TESTS AND SUBGROUP COMPARISONS

The statistics in this report represent estimates of national performance based on samples of students, rather than values that could be calculated if every student in every country had answered every question. Consequently, it is important to measure the degree of uncertainty of the estimates. In PISA, each estimate has an associated degree of uncertainty, which is expressed through a standard error. The use of confidence intervals provides a way to make inferences about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. From an observed sample statistic and assuming a normal distribution, it can be inferred that the corresponding population result would lie within the confidence interval in 95 out of 100 replications of the measurement on different samples drawn from the same population.

In many cases, readers are primarily interested in whether a given value in a particular country is different from a second value in the same or another country, e.g. whether females in a country perform better than males in the same country. In the tables and charts used in this report, differences are labelled as statistically significant when a difference of that size, smaller or larger, would be observed less than 5% of the time, if there were actually no difference in corresponding population values. Similarly, the risk of reporting a correlation as significant if there is, in fact, no correlation between two measures, is contained at 5%.

Throughout the report, significance tests were undertaken to assess the statistical significance of the comparisons made.

Gender differences

Gender differences in student performance or other indices were tested for statistical significance. Positive differences indicate higher scores for males while negative differences indicate higher scores for females. Generally, differences marked in bold in the tables in this volume are statistically significant at the 95% confidence level.

Performance differences between the top and bottom quartiles of PISA indices and scales

Differences in average performance between the top and bottom quarters of the PISA indices and scales were tested for statistical significance. Figures marked in bold indicate that performance between the top and bottom quarters of students on the respective index is statistically significantly different at the 95% confidence level.

Change in the performance per unit of the index

For many tables, the difference in student performance per unit of the index shown was calculated. Figures in bold indicate that the differences are statistically significantly different from zero at the 95% confidence level.

Difference in reading performance between native students and students with an immigrant background

Differences in performance between native and non-native students were tested for statistical significance. For this purpose, first-generation and second-generation students were jointly considered as students with an immigrant background. Positive differences represent higher scores for native students, while negative differences represent higher scores for first-generation and second-generation students. Figures in bold in data tables presented in this volume indicate statistically significantly different scores at the 95% confidence level.

ANNEX A4
QUALITY ASSURANCE

Quality assurance procedures were implemented in all parts of PISA 2009, as was done for all previous PISA surveys.

The consistent quality and linguistic equivalence of the PISA 2009 assessment instruments were facilitated by providing countries with equivalent source versions of the assessment instruments in English and French, and requiring countries (other than those assessing students in English and French) to prepare and consolidate two independent translations using both source versions. Precise translation and adaptation guidelines were supplied, also including instructions for selecting and training the translators. For each country, the translation and format of the assessment instruments (including test materials, marking guides, questionnaires and manuals) were verified by expert translators appointed by the PISA Consortium before they were used in the PISA 2009 Field Trial and Main Study. These translators' mother tongue was the language of instruction in the country concerned and they were knowledgeable about education systems. For further information on the PISA translation procedures, see the *PISA 2009 Technical Report* (OECD, forthcoming).

The survey was implemented through standardised procedures. The PISA Consortium provided comprehensive manuals that explained the implementation of the survey, including precise instructions for the work of School Co-ordinators and scripts for Test Administrators to use during the assessment sessions. Proposed adaptations to survey procedures, or proposed modifications to the assessment session script, were submitted to the PISA Consortium for approval prior to verification. The PISA Consortium then verified the national translation and adaptation of these manuals.

To establish the credibility of PISA as valid and unbiased, and to encourage uniformity in administering the assessment sessions, Test Administrators in participating countries were selected using the following criteria: it was required that the Test Administrator not be the reading, mathematics or science instructor of any students in the sessions he or she would administer for PISA; it was recommended that the Test Administrator not be a member of the staff of any school where he or she would administer for PISA; and it was considered preferable that the Test Administrator not be a member of the staff of any school in the PISA sample. Participating countries organised an in-person training session for Test Administrators.

Participating countries were required to ensure that: Test Administrators worked with the School Co-ordinator to prepare the assessment session, including updating student tracking forms and identifying excluded students; no extra time was given for the cognitive items (while it was permissible to give extra time for the student questionnaire); no instrument was administered before the two one-hour parts of the cognitive session; Test Administrators recorded the student participation status on the student tracking forms and filled in a Session Report Form; no cognitive instrument was permitted to be photocopied; no cognitive instrument could be viewed by school staff before the assessment session; and Test Administrators returned the material to the National Centre immediately after the assessment sessions.

National Project Managers were encouraged to organise a follow-up session when more than 15% of the PISA sample was not able to attend the original assessment session.

National Quality Monitors from the PISA Consortium visited all National Centres to review data-collection procedures. Finally, School Quality Monitors from the PISA Consortium visited a sample of 15 schools during the assessment. For further information on the field operations, see the *PISA 2009 Technical Report* (OECD, forthcoming).

Marking procedures were designed to ensure consistent and accurate application of the marking guides outlined in the PISA Operations Manuals. National Project Managers were required to submit proposed modifications to these procedures to the Consortium for approval. Reliability studies to analyse the consistency of marking were implemented, these are discussed in more detail below.

Software specially designed for PISA facilitated data entry, detected common errors during data entry, and facilitated the process of data cleaning. Training sessions familiarised National Project Managers with these procedures.

For a description of the quality assurance procedures applied in PISA and in the results, see the *PISA 2009 Technical Report* (OECD, forthcoming).

The results of data adjudication show that the PISA Technical Standards were fully met in all countries and economies that participated in PISA 2009, though for one country, some serious doubts were raised. Analysis of the data for Azerbaijan suggest that the PISA Technical Standards may not have been fully met for the following four main reasons: *i)* the order of difficulty of the clusters is inconsistent with previous experience and the ordering varies across booklets; *ii)* the percentage correct on some items is higher than that of the highest scoring countries; *iii)* the difficulty of the clusters varies widely across booklets; and *iv)* the coding of items in Azerbaijan is at an extremely high level of agreement between independent coders, and was judged, on some items, to be too lenient. However, further investigation of the survey instruments, the procedures for test implementation and coding of student responses at the national level did not provide sufficient evidence of systematic errors or violations of the PISA Technical Standards. Azerbaijan's data are, therefore, included in the PISA 2009 international dataset.

For the PISA 2009 assessment in Austria, a dispute between teacher unions and the education minister has led to the announcement of a boycott of PISA which was withdrawn after the first week of testing. The boycott required the OECD to remove identifiable cases from the dataset. Although the Austrian dataset met the PISA 2009 technical standards after the removal of these cases, the negative atmosphere in regard to educational assessment has affected the conditions under which the assessment was administered and could have adversely affected student motivation to respond to the PISA tasks. The comparability of the 2009 data with data from earlier PISA assessments can therefore not be ensured and data for Austria have therefore been excluded from trend comparisons.

ANNEX A5
PARTICIPATION OF COUNTRIES ACROSS PISA ASSESSMENTS

Not all the OECD members participated in every PISA assessment and the list of participating partner countries and economies has widened substantially since 2000. As explained in Chapter 1, reading performance trends are reported for all countries that have comparable results in both the 2000 and 2009 assessments, because PISA 2000 focused on reading and established a performance scale that was comparable across all future assessments. Since PISA 2003 focused on mathematics and established a performance scale that became the baseline for subsequent mathematics assessments, trends in mathematics are reported only for countries that have comparable results in both the 2003 and 2009 assessments. For science, only 2006 and 2009 assessments provide comparable results since PISA 2006 focused on science and established a baseline scale for science.

As a consequence, the countries for which trends are reported differ between assessment areas (Table A5.1). Moreover, the group of OECD countries for which the OECD average can be compared across time also differs between assessment areas.

As explained in Chapter 1, for methodological reasons, some countries have not been included in comparisons between 2000, 2003, 2006 and 2009. The PISA 2000 sample for the Netherlands did not meet the PISA response-rate standards. Therefore, the mean scores for the Netherlands were not reported for 2000. In Luxembourg, the assessment conditions were changed substantially between the 2000 and 2003 PISA surveys. Therefore, results are only comparable between 2003, 2006 and 2009. The PISA 2000 and PISA 2003 samples for the United Kingdom did not meet the PISA response-rate standards, so data from the United Kingdom are not comparable to the other countries. For the United States, no reading results are available for 2006. The sampling weights for the PISA 2000 assessment in Austria have been adjusted to allow for comparisons with subsequent PISA assessments. However, due to a boycott of PISA in some Austrian schools it was not possible to ensure the comparability of the 2009 data with those from earlier assessments. Therefore, data for Austria have been excluded from trend comparisons. Details of this are given in the main text and in the endnotes to Chapter 1.

For comparing trends in reading, this volume considers the 38 countries that have comparable results in both the 2000 and 2009 assessments. This includes the 26 OECD countries. Among the 34 current OECD members, Estonia, the Slovak Republic, Slovenia and Turkey did not participate in PISA 2000, while 2000 data for Luxembourg, the Netherlands and the United Kingdom, and 2009 data for Austria, are deemed not sufficiently comparable with those from other PISA assessments and were excluded from the analysis. The OECD 26 average is reported for most comparisons in this volume, namely, whenever 2009 results are compared to those from 2000. However, three other OECD countries do not have valid results for the 2003 or 2006 assessments. Chile and Israel did not participate in 2003, while no data on reading for the United States were available for 2006. Thus, across the four reading assessments, only the OECD 23 average can be calculated. The OECD 23 average is reported in tables where data for 2000 and 2009 are reported together with results for 2003 and 2006.

For comparing trends in mathematics, results are discussed for the 39 countries that have comparable results for the 2003 and 2009 assessments. These include 28 OECD countries. Chile, Estonia, Israel and Slovenia did not participate in PISA 2003, while data for the United Kingdom were deemed not comparable for 2003 and data for Austria were deemed not comparable for 2009.

For comparing trends in science, 56 countries that participated in the 2006 and 2009 assessments are compared, including 33 OECD countries. Data for Austria were deemed not comparable for 2009.

Thus, several different OECD averages are reported in this volume. The OECD 26 average is reported for all comparisons between 2000 and 2009. For comparisons of reading performance across all four PISA assessments, the OECD 23 average is reported in Tables V.2.1, V.2.3 and V.2.7. In Table V.2.9, the OECD 28 average is reported for comparisons between 2003 and 2009 and the OECD 32 average is reported for comparisons between 2006 and 2009. For mathematics, the OECD 28 average is used to compare results. For science the OECD average for 33 OECD members is presented.

As a result, the OECD averages for cross-sectional comparisons reported in other volumes of this report differ from the ones reported in Volume V for comparing student performance and other measures over time.

The OECD average is calculated separately for each assessment and includes all the OECD countries that have valid results in this assessment. In some cases, the results for one or two OECD countries are not reported due to small sample size, which is denoted by "c", missing data ("m") or because results were withdrawn ("w"). In such cases, the OECD average for one assessment can be calculated for a smaller number of countries than for the other assessment. The change in the OECD average includes only countries that have valid results in both assessments. Therefore, in some rare cases, the difference between OECD averages calculated separately for two assessments do not equal the change in the OECD average. For example, because socio-economic data were not collected in PISA 2000 in Japan, the OECD average reported in Table V.4.3 for 2000 does not include Japan. Similarly, the change in the OECD average is calculated without Japan. However, the 2009 average does include Japan. Similarly, averages reported in Tables V.4.4 and V.4.5 are calculated for countries that have sufficient number of observations to report performance gaps between various groups of students. OECD averages in Tables V.4.1 and V.4.3 include France; however, the data for France were withdrawn from the tables.

[Part 1/1]

Table A5.1 Participation of countries in different PISA assessments

		PISA 2000	PISA 2003	PISA 2006	PISA 2009
OECD	Australia	yes	yes	yes	yes
	Austria	yes	yes	yes	not comparable
	Belgium	yes	yes	yes	yes
	Canada	yes	yes	yes	yes
	Chile	yes	no	yes	yes
	Czech Republic	yes	yes	yes	yes
	Denmark	yes	yes	yes	yes
	Estonia	no	no	yes	yes
	Finland	yes	yes	yes	yes
	France	yes	yes	yes	yes
	Germany	yes	yes	yes	yes
	Greece	yes	yes	yes	yes
	Hungary	yes	yes	yes	yes
	Iceland	yes	yes	yes	yes
	Ireland	yes	yes	yes	yes
	Israel	yes	no	yes	yes
	Italy	yes	yes	yes	yes
	Japan	yes	yes	yes	yes
	Korea	yes	yes	yes	yes
	Luxembourg	not comparable	yes	yes	yes
	Mexico	yes	yes	yes	yes
	Netherlands	not comparable	yes	yes	yes
	New Zealand	yes	yes	yes	yes
	Norway	yes	yes	yes	yes
	Poland	yes	yes	yes	yes
	Portugal	yes	yes	yes	yes
	Slovak Republic	no	yes	yes	yes
	Slovenia	no	no	yes	yes
	Spain	yes	yes	yes	yes
	Sweden	yes	yes	yes	yes
	Switzerland	yes	yes	yes	yes
	Turkey	no	yes	yes	yes
	United Kingdom	not comparable	not comparable	yes	yes
	United States	yes	yes	reading results not available	yes
	Number of OECD countries that have valid data in:				
	reading	27	29	33	33
	mathematics	not comparable	29	34	33
	science	not comparable	not comparable	34	33
Partners	Albania	yes	no	no	yes
	Argentina	yes	no	yes	yes
	Azerbaijan	no	no	yes	yes
	Brazil	yes	yes	yes	yes
	Bulgaria	yes	no	yes	yes
	Chinese Taipei	no	no	yes	yes
	Colombia	no	no	yes	yes
	Croatia	no	no	yes	yes
	Dubai (UAE)	no	no	no	yes
	Hong Kong-China	yes	yes	yes	yes
	Indonesia	yes	yes	yes	yes
	Jordan	no	no	yes	yes
	Kazakhstan	no	no	no	yes
	Kyrgyzstan	no	no	yes	yes
	Latvia	yes	yes	yes	yes
	Liechtenstein	yes	yes	yes	yes
	Lithuania	no	no	yes	yes
	Macao-China	no	yes	yes	yes
	Montenegro	no	no	yes	yes
	Panama	no	no	no	yes
	Peru	yes	no	no	yes
	Qatar	no	no	yes	yes
	Romania	yes	no	yes	yes
	Russian Federation	yes	yes	yes	yes
	Serbia	no	yes	yes	yes
	Shanghai-China	no	no	no	yes
	Singapore	no	no	no	yes
	Thailand	yes	yes	yes	yes
	Trinidad and Tobago	no	no	no	yes
	Tunisia	no	yes	yes	yes
	Uruguay	no	yes	yes	yes

ANNEX A6
LINEAR AND ADJUSTED TRENDS

Survey results can vary between assessments due to sampling and measurement errors, even if the true proficiency level of students does not change. The precision of the results can be increased by using information from all assessments. This provides an opportunity to look at trends more robustly than is possible by using just two observations. This annex describes how a linear regression model was fitted to results from the four PISA assessments to estimate linear trends.

Moreover, when reviewing and interpreting the changes in country-level PISA results it is important to account for the potential influence of changes in factors such as demography and sampling methodology on the results. This was highlighted by Gebhardt and Adams (2007) who illustrated how changes over time in factors such as the estimated distribution of socio-economic background and the estimated percentage of male and female students can have a material effect on the trend results.

Gebhardt and Adams (2007) referred to trends that were unadjusted for such changes as marginal trends and trends that were adjusted as conditional trends. They found that a more complete understanding of country trend results could be obtained if both the marginal and conditional trends were reviewed. This report refers to these two sets of results as unadjusted and adjusted trends, respectively.

As the results presented in Chapter 2 and in this Annex demonstrate, these adjustments do not alter the main conclusions regarding trends in different countries. Chapter 2 of this volume discusses those cases when such adjustments do lead to different conclusions.

Linear trends

Trends cannot be assessed fully when only looking at the difference in performance between two points in time. In some countries, the average performance varies across assessments with year-to-year changes in different directions. To see whether performance in a particular country varies around similar levels or consistently increases or declines over time, the following method of combining information from successive PISA assessments was used.

Chapter 2 summarises reading performance from all assessments in one indicator. This indicator is obtained from a linear regression, which was applied at country level, to the results from all available PISA assessments. Although the same method is applied for countries with results from two, three or four assessments, the linear trends indicator is more precise for countries with valid results from all four PISA reading assessments. In cases where countries have data from just two assessments, the linear trends are identical to the annualised difference between these two assessments.

In all cases, linear trends are expressed in performance changes by one year, so that the results can be compared between countries even if they participated in different assessments covering different time periods. Thus, linear trends are represented on a similar scale to annualised trends that are also discussed in Chapter 2. However, linear trends do account for data from several assessments, if they are available, while the annualised trend is equal to a difference between two assessments divided by the number of years between them.

Some countries administered the PISA 2000 assessment one or two years later (see endnote 6 in Chapter 1). This is taken into account when estimating linear trends.

As for all statistics presented in this report, the precision of trend estimates needs to be estimated. For linear trends, the standard errors have to account for two sources of random variation: (i) those related to sampling variation and (ii) those related to the link error associated with comparing results across successive assessments (see Annex A1 for details on link error).

The link error reflects the precision with which student performance scores are aligned across assessments. For changes in performance between two assessments link errors were estimated and incorporated in the presented results (see Annex A1 for details). For linear trends, the Monte Carlo approach was used to estimate the standard errors of regression parameters (*i.e.* the linear trend). Under the Monte Carlo approach, 500 sets of possible means were drawn for each country. These means were drawn assuming that the uncertainty associated with each national mean was independent over time and was normally distributed around the estimated mean with a variance that was

estimated by combining the sampling and link errors. Linear regressions were run for each of the 500 replications and standard errors were estimated via the standard deviations of the 500 estimated regression coefficients.

Adjusted trends

PISA maintains its technical standards over time. Although this means that trends can be calculated over comparable populations, in some countries small departures in sampling methods were observed. Furthermore, the demographic characteristics and socio-economic background of 15-year-old populations can also be subject to change. To draw reliable conclusions from trends results, it is important to check if those reported without any corrections were sustained after adjusting for the demographic and socio-economic background of students.

Linear regression can be used to adjust performance results for differences in student background. The regression model used for this report includes the background characteristics that were to be accounted for and allows the relationship between them and student performance to vary across assessments. In this way, three kinds of results were calculated separately for each country: (i) the adjusted performance results from each assessment (ii) the adjusted difference between two assessments, and (iii) the adjusted linear trend from several assessments.

The adjusted reading performance results reported in Chapter 2 use the 2009 PISA sample as a reference. Thus, the results from previous assessments were adjusted to be comparable to the 2009 results. This was achieved by centring background characteristics on the 2009 average values for each country and then carrying out a regression with centred background characteristics to obtain adjusted trends. In other words, results for 2000, 2003 and 2006 were adjusted to match the 2009 data.

Table A6.1 provides means for background variables, with the following measures used for the adjustment: the student gender and age, as well as indicators for students whose language spoken at home is different from the language of assessment, whether the student was born in another country, whether the student's mother was born in another country and whether the student's father was born in another country. The last columns show changes in these characteristics. The results were also adjusted for changes in the socio-economic background as measured by *the PISA index of economic, social and cultural status* (variable ESCS). As explained in Annex A1, the ESCS index was re-estimated for 2000, 2003 and 2006 assessments to be comparable with 2009 results. Mean values, the standard deviation and changes in these statistics for the re-estimated ESCS index are reported in Table V.4.3. These statistics could differ from those reported in 2000, 2003 and 2006 reports, since the re-estimated values of the ESCS index that are comparable with 2009 results can differ slightly from those reported in previous assessments. In both tables, changes that are in bold print suggest that mean values on the respective measure changed between assessments. In this case, the difference between unadjusted and adjusted trends reflects this change with adjusted trends accounting for it.

Unadjusted performance results are averaged across all students participating in PISA assessments. Thus, adjusted results should be also calculated over all participants in each country. That is not always possible, as in some cases, information on student background characteristics is missing due to non-response or invalid responses. Imputation of missing values was needed prior to the adjustments to sustain sample sizes and comparisons with unadjusted results. This was achieved using multiple imputation models that maintained the relationships between performance and background characteristics when imputing missing information (Rubin, 1987; Royston, 2004). The imputation model was carried out once for each plausible value and included all student background characteristics that were listed in the previous paragraph. After the imputation, all calculations were carried out five times, once for each imputed dataset containing one of five plausible values of the performance measures. Final results were obtained by averaging regression outcomes obtained from each imputed dataset and by accounting for imputation error using so-called Rubin's combination rules (Rubin, 1987). The results after imputation differ negligibly from those without the imputation given that for most countries and assessments the number of missing observations was relatively low.

Adjusting trends for changes in the age and gender of students

The population of students assessed by PISA are 15-year-olds enrolled in education. However, in some countries, the testing window may have moved slightly between PISA assessments, which can affect trends. For example, if, during one assessment, students were two months younger than the average student tested in PISA, comparisons with other countries would not be affected, as a two-month age difference is negligible. However, if students were two months older in another assessment, the average age in the two samples could differ by four months, which is more substantial. If these differences are then related to other discrepancies between student samples across time,

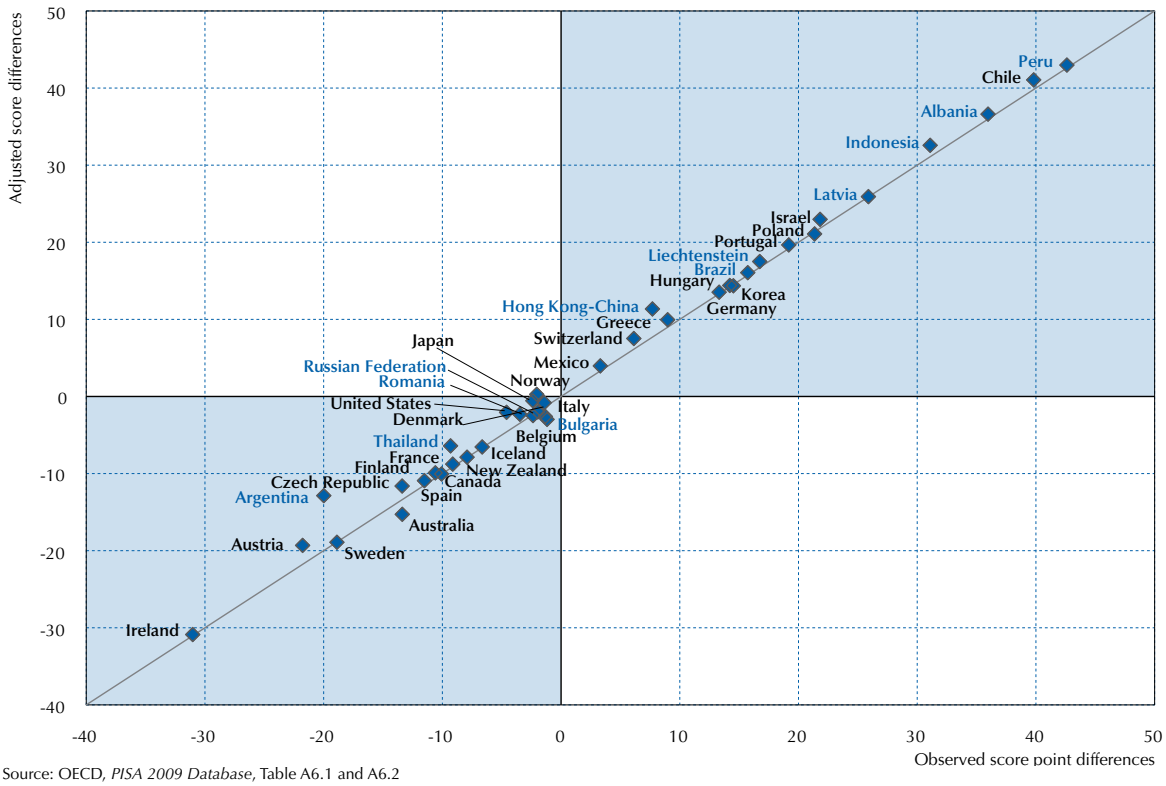
the comparability of trends can suffer, producing higher values for countries where the mean age difference between two assessments is larger. In fact, however, age differences between PISA assessments are minor, with a maximum of one month difference among countries.

Another common criterion in sampling populations is gender representation. Because girls' reading performance is usually higher than that of boys, gender imbalances among samples from different PISA assessments can affect the reliability of trend estimates. For example, if girls show higher achievement and girls were more numerous in PISA 2000 than in PISA 2009, there would be a downward change in achievement, as the composition of PISA 2000 sample was more favourable. Gender imbalance is very rare in PISA assessments, but PISA reviewed whether small changes in the percentage of boys and girls have affected trends.

Results for trends adjusted for age and gender sampling differences are compared to unadjusted trend estimates in Figure A6.1 (see also Table A6.2 with adjusted trends and adjusted results for 2000, 2003 and 2006). The trends are very similar. This shows that PISA sampling procedures are consistent and assure comparability of results between and within countries over time. Chapter 2 discusses results for further adjustments, accounting for changes in the demographic and socio-economic background of students.

■ Figure A6.1 ■

Observed score change and score point change adjusted for sampling differences between 2000 and 2009



Source: OECD, *PISA 2009 Database*, Table A6.1 and A6.2

[Part 1/3]

Table A6.1 Student background characteristics in PISA 2000 and 2009

		PISA 2000									
		Percentage of girls		Age		Student born in another country		Student's mother born in another country		Student's father born in another country	
		%	S.E.	Mean	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	**Australia**	47.5	(2.2)	15.7	(0.0)	13.0	(1.2)	31.5	(1.6)	33.0	(1.7)
	Austria	48.8	(2.3)	15.8	(0.0)	8.1	(0.7)	14.1	(1.0)	13.7	(0.9)
	Belgium	47.9	(1.7)	15.7	(0.0)	5.8	(0.5)	16.9	(1.1)	18.6	(1.2)
	Canada	50.1	(0.5)	15.8	(0.0)	10.7	(0.6)	24.9	(1.0)	26.8	(1.1)
	Chile	53.0	(1.8)	15.8	(0.0)	1.5	(0.2)	0.9	(0.2)	1.1	(0.2)
	Czech Republic	51.7	(1.8)	15.8	(0.0)	1.0	(0.1)	4.5	(0.3)	4.8	(0.3)
	Denmark	49.7	(0.9)	15.7	(0.0)	6.3	(0.5)	9.5	(0.6)	10.0	(0.7)
	Finland	51.4	(0.8)	15.7	(0.0)	2.5	(0.3)	2.1	(0.3)	2.6	(0.3)
	France	51.3	(1.3)	15.9	(0.0)	3.5	(0.3)	17.2	(1.0)	19.6	(1.0)
	Germany	49.7	(1.5)	15.8	(0.0)	11.3	(0.6)	18.0	(0.9)	19.0	(0.9)
	Greece	49.8	(1.3)	15.8	(0.0)	6.6	(1.0)	8.6	(1.0)	6.8	(1.0)
	Hungary	49.6	(2.1)	15.7	(0.0)	2.2	(0.2)	2.7	(0.3)	2.8	(0.3)
	Iceland	50.4	(0.8)	15.7	(0.0)	5.9	(0.4)	3.2	(0.4)	3.8	(0.4)
	Ireland	50.4	(1.8)	15.7	(0.0)	4.2	(0.4)	7.9	(0.5)	6.0	(0.5)
	Israel	58.2	(2.7)	15.7	(0.0)	10.9	(1.2)	34.2	(1.9)	36.3	(2.1)
	Italy	49.3	(2.7)	15.7	(0.0)	2.2	(0.3)	3.7	(0.3)	2.2	(0.3)
	Japan	50.5	(2.4)	15.8	(0.0)	0.2	(0.1)	0.4	(0.1)	0.3	(0.1)
	Korea	44.1	(3.5)	15.7	(0.0)	m	m	m	m	m	m
	Luxembourg	m	m	m	m	m	m	m	m	m	m
	Mexico	50.0	(1.2)	15.8	(0.0)	3.2	(0.4)	4.5	(0.4)	4.7	(0.4)
	Netherlands	m	m	m	m	m	m	m	m	m	m
	New Zealand	49.7	(2.4)	15.7	(0.0)	16.7	(0.9)	27.3	(1.1)	29.4	(1.2)
	Norway	49.0	(0.9)	15.8	(0.0)	5.5	(0.4)	7.6	(0.5)	7.9	(0.5)
	Poland	49.1	(2.6)	15.7	(0.0)	1.0	(0.2)	0.7	(0.2)	1.5	(0.3)
	Portugal	52.0	(0.9)	15.7	(0.0)	6.0	(0.5)	6.9	(0.4)	6.1	(0.4)
	Spain	50.8	(1.3)	15.8	(0.0)	2.5	(0.4)	4.3	(0.4)	3.6	(0.4)
	Sweden	49.2	(0.9)	15.7	(0.0)	8.3	(0.6)	15.7	(0.9)	16.1	(1.1)
	Switzerland	49.8	(1.0)	15.9	(0.0)	14.1	(0.7)	28.3	(0.9)	28.9	(1.0)
	United Kingdom	m	m	m	m	m	m	m	m	m	m
	United States	51.6	(1.0)	15.8	(0.0)	7.3	(1.0)	15.8	(2.3)	17.2	(2.5)
	OECD average - 23	49.7	(0.4)	15.8	(0.0)	6.0	(0.1)	11.2	(0.2)	11.6	(0.2)
	OECD average - 26	50.2	(0.3)	15.8	(0.0)	6.1	(0.1)	11.9	(0.2)	12.4	(0.2)
Partners	**Albania**	51.0	(1.2)	15.7	(0.0)	0.5	(0.1)	1.2	(0.2)	1.3	(0.2)
	Argentina	56.4	(2.5)	15.9	(0.0)	0.8	(0.2)	5.1	(0.8)	5.5	(0.4)
	Brazil	54.0	(1.2)	15.8	(0.0)	0.2	(0.1)	0.8	(0.2)	1.1	(0.2)
	Bulgaria	48.5	(1.9)	15.7	(0.0)	1.1	(0.2)	2.3	(0.3)	1.6	(0.3)
	Hong Kong-China	49.8	(2.1)	15.8	(0.0)	20.7	(0.9)	52.3	(1.0)	54.2	(1.2)
	Indonesia	51.1	(1.8)	15.7	(0.0)	0.3	(0.1)	0.5	(0.1)	0.6	(0.1)
	Latvia	51.3	(1.6)	15.7	(0.0)	30.5	(3.4)	30.8	(2.6)	30.9	(2.5)
	Liechtenstein	49.7	(2.9)	15.7	(0.0)	12.9	(1.8)	35.4	(2.6)	30.4	(2.6)
	Peru	49.9	(2.2)	15.9	(0.0)	0.6	(0.1)	0.7	(0.2)	1.1	(0.2)
	Romania	52.7	(1.1)	15.8	(0.0)	0.2	(0.1)	0.5	(0.2)	0.6	(0.2)
	Russian Federation	50.1	(0.9)	15.8	(0.0)	5.4	(0.5)	8.1	(0.7)	9.6	(0.8)
	Thailand	58.8	(2.0)	15.8	(0.0)	0.1	(0.0)	0.9	(0.5)	1.1	(0.5)

Note: Values that are statistically significant are indicated in bold (see Annex A3).

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[Part 2/3]

Table A6.1 Student background characteristics in PISA 2000 and 2009

		PISA 2009									
		Percentage of girls		Age		Student born in another country		Student's mother born in another country		Student's father born in another country	
		%	S.E.	Mean	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	**Australia**	51.1	(1.3)	15.7	(0.0)	12.8	(0.6)	32.6	(1.1)	33.1	(1.1)
	Austria	m	m	m	m	m	m	m	m	m	m
	Belgium	48.9	(1.2)	15.8	(0.0)	9.2	(0.7)	20.5	(1.2)	21.7	(1.1)
	Canada	49.7	(0.5)	15.8	(0.0)	12.3	(0.7)	29.4	(1.3)	30.3	(1.3)
	Chile	49.0	(1.1)	15.8	(0.0)	1.1	(0.1)	1.1	(0.2)	1.4	(0.2)
	Czech Republic	46.8	(1.8)	15.8	(0.0)	1.4	(0.2)	4.8	(0.3)	6.2	(0.4)
	Denmark	50.5	(0.7)	15.7	(0.0)	4.7	(0.3)	12.2	(0.5)	13.1	(0.5)
	Finland	49.9	(0.5)	15.7	(0.0)	2.7	(0.3)	4.7	(0.4)	5.0	(0.5)
	France	51.3	(1.2)	15.9	(0.0)	5.0	(0.6)	18.5	(1.4)	20.3	(1.6)
	Germany	48.9	(1.0)	15.8	(0.0)	7.2	(0.4)	21.3	(1.1)	22.0	(1.0)
	Greece	50.9	(1.1)	15.7	(0.0)	9.0	(0.8)	15.6	(0.9)	11.2	(0.9)
	Hungary	49.6	(1.5)	15.7	(0.0)	2.0	(0.3)	3.8	(0.3)	3.3	(0.3)
	Iceland	50.3	(0.3)	15.7	(0.0)	6.3	(0.4)	6.6	(0.4)	5.5	(0.4)
	Ireland	49.4	(1.1)	15.7	(0.0)	14.9	(0.7)	17.0	(0.8)	16.4	(0.7)
	Israel	50.9	(0.9)	15.7	(0.0)	9.2	(0.8)	26.8	(1.1)	27.3	(1.1)
	Italy	48.6	(0.9)	15.7	(0.0)	5.8	(0.2)	9.7	(0.3)	7.6	(0.3)
	Japan	48.4	(1.8)	15.7	(0.0)	0.4	(0.1)	0.9	(0.1)	0.5	(0.1)
	Korea	47.3	(1.8)	15.7	(0.0)	0.4	(0.1)	0.3	(0.1)	m	m
	Luxembourg	49.3	(0.2)	15.8	(0.0)	19.3	(0.5)	48.0	(0.6)	49.2	(0.7)
	Mexico	50.6	(0.4)	15.7	(0.0)	2.4	(0.1)	2.9	(0.2)	3.0	(0.2)
	Netherlands	50.3	(0.7)	15.7	(0.0)	4.8	(0.5)	16.0	(1.6)	16.7	(1.6)
	New Zealand	49.0	(1.2)	15.7	(0.0)	20.8	(0.7)	32.5	(1.2)	32.8	(1.2)
	Norway	48.9	(0.5)	15.7	(0.0)	5.4	(0.4)	11.0	(0.6)	10.9	(0.7)
	Poland	50.0	(0.5)	15.7	(0.0)	0.4	(0.1)	0.1	(0.1)	0.5	(0.1)
	Portugal	51.1	(0.6)	15.7	(0.0)	7.4	(0.5)	13.0	(0.6)	11.2	(0.6)
	Spain	49.2	(0.6)	15.8	(0.0)	10.0	(0.5)	13.1	(0.5)	11.8	(0.5)
	Sweden	49.2	(0.5)	15.7	(0.0)	5.8	(0.5)	16.6	(1.3)	18.0	(1.3)
	Switzerland	49.2	(1.1)	15.8	(0.0)	10.9	(0.6)	33.7	(0.9)	32.2	(1.0)
	United Kingdom	50.9	(1.6)	15.7	(0.0)	6.8	(0.5)	14.2	(1.0)	15.8	(1.2)
	United States	48.7	(0.8)	15.7	(0.0)	7.4	(0.5)	23.3	(1.4)	23.6	(1.5)
	OECD average - 23	49.5	(0.2)	15.7	(0.0)	6.8	(0.1)	13.9	(0.2)	14.4	(0.2)
	OECD average - 26	49.5	(0.2)	15.7	(0.0)	6.7	(0.1)	14.3	(0.2)	14.8	(0.2)
Partners	**Albania**	48.7	(0.9)	15.8	(0.0)	1.5	(0.2)	0.8	(0.2)	0.8	(0.2)
	Argentina	53.7	(1.1)	15.7	(0.0)	1.9	(0.3)	6.3	(0.7)	6.3	(0.7)
	Brazil	53.1	(0.4)	15.9	(0.0)	0.5	(0.1)	1.1	(0.2)	1.7	(0.2)
	Bulgaria	48.1	(2.2)	15.8	(0.0)	1.3	(0.2)	1.9	(0.3)	1.3	(0.2)
	Hong Kong-China	47.1	(1.8)	15.7	(0.0)	22.8	(1.0)	53.0	(1.4)	45.8	(1.4)
	Indonesia	50.5	(1.9)	15.7	(0.0)	0.6	(0.1)	0.3	(0.1)	0.5	(0.2)
	Latvia	50.7	(0.9)	15.7	(0.0)	1.6	(0.3)	11.3	(0.9)	12.7	(1.0)
	Liechtenstein	47.0	(1.2)	15.7	(0.0)	26.1	(2.3)	54.2	(2.7)	48.1	(2.8)
	Peru	49.5	(1.2)	15.8	(0.0)	0.7	(0.1)	0.9	(0.1)	0.9	(0.1)
	Romania	50.9	(1.4)	15.7	(0.0)	0.6	(0.1)	0.5	(0.1)	0.6	(0.1)
	Russian Federation	50.4	(0.7)	15.8	(0.0)	6.9	(0.5)	16.7	(0.8)	17.2	(0.8)
	Thailand	56.7	(1.5)	15.7	(0.0)	0.1	(0.0)	0.0	(0.0)	0.1	(0.1)

Note: Values that are statistically significant are indicated in bold (see Annex A3).

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[Part 3/3]

Table A6.1 Student background characteristics in PISA 2000 and 2009

		Change between 2000 and 2009 (PISA 2009 – PISA 2000)									
		Percentage of girls		Age		Student born in another country		Student's mother born in another country		Student's father born in another country	
		% dif.	S.E.	Dif.	S.E.	% dif.	S.E.	% dif.	S.E.	% dif.	S.E.
OECD	Australia	3.6	(2.5)	0.02	(0.01)	-0.1	(1.4)	1.1	(2.0)	0.1	(2.0)
	Austria	m	m	m	m	m	m	m	m	m	m
	Belgium	1.1	(2.1)	**0.09**	(0.00)	**3.3**	(0.9)	**3.6**	(1.7)	3.1	(1.7)
	Canada	-0.4	(0.7)	**0.01**	(0.00)	1.6	(1.0)	**4.5**	(1.6)	**3.5**	(1.7)
	Chile	-4.0	(2.1)	**-0.02**	(0.01)	-0.4	(0.3)	0.3	(0.2)	0.2	(0.2)
	Czech Republic	-4.9	(2.5)	-0.00	(0.01)	0.4	(0.2)	0.3	(0.4)	**1.4**	(0.5)
	Denmark	0.8	(1.2)	-0.01	(0.01)	**-1.5**	(0.6)	**2.8**	(0.8)	**3.1**	(0.9)
	Finland	-1.5	(0.9)	0.01	(0.01)	0.1	(0.4)	**2.6**	(0.5)	**2.4**	(0.5)
	France	-0.1	(1.8)	**-0.01**	(0.01)	**1.5**	(0.6)	1.2	(1.7)	0.6	(1.9)
	Germany	-0.7	(1.8)	0.00	(0.01)	**-4.1**	(0.7)	**3.3**	(1.4)	**3.0**	(1.3)
	Greece	1.1	(1.7)	**-0.08**	(0.01)	2.3	(1.3)	**7.0**	(1.3)	**4.5**	(1.3)
	Hungary	-0.0	(2.6)	-0.01	(0.01)	-0.2	(0.4)	**1.1**	(0.4)	0.5	(0.4)
	Iceland	-0.2	(0.9)	0.00	(0.01)	0.4	(0.5)	**3.4**	(0.6)	**1.7**	(0.5)
	Ireland	-1.1	(2.1)	0.01	(0.01)	**10.7**	(0.8)	**9.1**	(1.0)	**10.4**	(0.9)
	Israel	**-7.3**	(2.8)	**0.02**	(0.01)	-1.7	(1.4)	**-7.4**	(2.2)	**-9.0**	(2.3)
	Italy	-0.7	(2.9)	**-0.02**	(0.00)	**3.6**	(0.4)	**6.0**	(0.4)	**5.4**	(0.4)
	Japan	-2.1	(2.9)	**-0.09**	(0.01)	0.2	(0.1)	**0.6**	(0.1)	0.2	(0.1)
	Korea	3.1	(4.0)	**-0.04**	(0.01)	m	m	m	m	m	m
	Luxembourg	m	m	m	m	m	m	m	m	m	m
	Mexico	0.6	(1.3)	**-0.07**	(0.01)	-0.7	(0.4)	**-1.6**	(0.5)	**-1.7**	(0.4)
	Netherlands	m	m	m	m	m	m	m	m	m	m
	New Zealand	-0.8	(2.7)	**0.01**	(0.01)	**4.0**	(1.2)	**5.2**	(1.6)	**3.4**	(1.6)
	Norway	-0.1	(1.0)	**-0.09**	(0.01)	-0.1	(0.6)	**3.4**	(0.8)	**3.1**	(0.8)
	Poland	0.8	(2.7)	-0.00	(0.01)	**-0.6**	(0.3)	**-0.6**	(0.2)	**-1.1**	(0.3)
	Portugal	-0.8	(1.1)	-0.01	(0.01)	1.3	(0.7)	**6.1**	(0.7)	**5.1**	(0.7)
	Spain	-1.6	(1.5)	**-0.01**	(0.00)	**7.6**	(0.7)	**8.8**	(0.7)	**8.2**	(0.7)
	Sweden	-0.0	(1.0)	0.00	(0.01)	**-2.5**	(0.8)	0.9	(1.6)	1.9	(1.7)
	Switzerland	-0.6	(1.5)	**-0.07**	(0.01)	**-3.2**	(0.9)	**5.3**	(1.3)	**3.4**	(1.4)
	United Kingdom	m	m	m	m	m	m	m	m	m	m
	United States	**-2.9**	(1.2)	**-0.06**	(0.01)	0.1	(1.1)	**7.5**	(2.7)	**6.4**	(3.0)
	OECD average - 23	-0.2	(0.4)	-0.0	(0.0)	**1.1**	(0.2)	**3.2**	(0.2)	**2.8**	(0.2)
	OECD average - 26	-0.7	(0.4)	-0.0	(0.0)	**0.9**	(0.2)	**2.9**	(0.2)	**2.4**	(0.3)
Partners	Albania	-2.3	(1.5)	**0.03**	(0.01)	**1.0**	(0.3)	-0.3	(0.3)	-0.5	(0.3)
	Argentina	-2.7	(2.7)	**-0.16**	(0.01)	**1.1**	(0.3)	1.2	(1.1)	0.8	(0.8)
	Brazil	-0.9	(1.2)	**0.07**	(0.01)	**0.3**	(0.2)	0.3	(0.2)	**0.6**	(0.3)
	Bulgaria	-0.4	(2.9)	**0.09**	(0.01)	0.1	(0.3)	-0.4	(0.4)	-0.3	(0.3)
	Hong Kong-China	-2.8	(2.7)	**-0.11**	(0.01)	2.1	(1.4)	0.7	(1.8)	**-8.4**	(1.8)
	Indonesia	-0.7	(2.7)	**-0.07**	(0.01)	0.3	(0.2)	-0.2	(0.2)	-0.1	(0.2)
	Latvia	-0.7	(1.8)	0.02	(0.01)	**-28.9**	(3.4)	**-19.5**	(2.7)	**-18.2**	(2.7)
	Liechtenstein	-2.7	(3.1)	0.01	(0.02)	**13.2**	(3.0)	**18.8**	(3.7)	**17.7**	(3.8)
	Peru	-0.4	(2.5)	**-0.07**	(0.01)	0.2	(0.2)	0.2	(0.2)	-0.2	(0.2)
	Romania	-1.8	(1.8)	**-0.04**	(0.01)	**0.4**	(0.1)	0.0	(0.2)	0.0	(0.2)
	Russian Federation	0.4	(1.1)	-0.01	(0.01)	**1.5**	(0.7)	**8.6**	(1.1)	**7.6**	(1.1)
	Thailand	-2.1	(2.6)	**-0.14**	(0.01)	-0.0	(0.1)	-0.9	(0.5)	-0.9	(0.5)

Note: Values that are statistically significant are indicated in bold (see Annex A3).
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[Part 1/1]

Table A6.2 Trends adjusted for sampling differences

		Adjusted PISA 2000 results		Adjusted PISA 2003 results		Adjusted PISA 2006 results		Original PISA 2009 results		Change between 2000 and 2009 (PISA 2009 - PISA 2000)	
		Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Score dif.	S.E.
OECD	Australia	530	(3.4)	526	(2.0)	514	(1.9)	515	(2.3)	**-15.3**	(6.5)
	Austria	490	(2.5)	490	(3.5)	491	(4.3)	m	m	m	m
	Belgium	509	(3.6)	507	(2.5)	502	(3.0)	506	(2.3)	-3.0	(6.5)
	Canada	534	(1.6)	528	(1.8)	527	(2.4)	524	(1.5)	-10.0	(5.4)
	Chile	408	(3.5)	m	m	443	(4.9)	449	(3.1)	**41.1**	(6.8)
	Czech Republic	490	(2.5)	488	(3.5)	484	(4.2)	478	(2.9)	-11.6	(6.3)
	Denmark	497	(2.4)	492	(2.8)	495	(3.2)	495	(2.1)	-2.0	(5.9)
	Estonia	m	m	m	m	501	(2.9)	501	(2.6)	m	m
	Finland	546	(2.6)	543	(1.6)	548	(2.1)	536	(2.3)	-9.9	(6.0)
	France	504	(2.6)	496	(2.7)	490	(4.1)	496	(3.4)	-8.8	(6.6)
	Germany	484	(2.4)	493	(3.5)	495	(4.4)	497	(2.7)	**13.5**	(6.1)
	Greece	473	(4.9)	472	(4.1)	460	(3.8)	483	(4.3)	10.0	(8.2)
	Hungary	480	(3.9)	483	(2.5)	483	(3.2)	494	(3.2)	**14.4**	(7.1)
	Iceland	507	(1.4)	493	(1.5)	485	(1.9)	500	(1.4)	-6.5	(5.3)
	Ireland	527	(3.2)	515	(2.6)	517	(3.4)	496	(3.0)	**-30.9**	(6.6)
	Israel	451	(8.6)	m	m	438	(4.5)	474	(3.6)	**23.0**	(10.6)
	Italy	487	(2.8)	474	(3.1)	468	(2.4)	486	(1.6)	-0.8	(5.9)
	Japan	520	(5.2)	495	(4.1)	497	(3.7)	520	(3.5)	-0.6	(8.0)
	Korea	525	(2.2)	535	(2.8)	554	(3.5)	539	(3.5)	**14.4**	(6.4)
	Luxembourg	m	m	481	(1.5)	479	(1.3)	472	(1.3)	m	m
	Mexico	421	(3.3)	399	(4.1)	410	(3.0)	425	(2.0)	4.0	(6.2)
	Netherlands	m	m	513	(2.8)	507	(2.9)	508	(5.1)	m	m
	New Zealand	529	(2.5)	521	(2.3)	520	(2.7)	521	(2.4)	-7.9	(6.0)
	Norway	503	(2.7)	499	(2.9)	485	(3.2)	503	(2.6)	0.3	(6.2)
	Poland	479	(4.6)	497	(2.8)	508	(2.7)	500	(2.6)	**21.1**	(7.2)
	Portugal	470	(4.4)	475	(3.9)	472	(3.5)	489	(3.1)	**19.7**	(7.3)
	Slovak Republic	m	m	470	(3.0)	467	(3.0)	477	(2.5)	m	m
	Slovenia	m	m	m	m	494	(1.0)	483	(1.0)	m	m
	Spain	492	(2.7)	479	(2.7)	461	(2.2)	481	(2.0)	-10.9	(6.0)
	Sweden	516	(2.2)	514	(2.4)	507	(3.4)	497	(2.9)	**-18.9**	(6.1)
	Switzerland	493	(4.1)	500	(3.0)	500	(3.0)	501	(2.4)	7.5	(6.9)
	Turkey	m	m	441	(5.7)	447	(4.2)	464	(3.5)	m	m
	United Kingdom	m	m	m	m	495	(2.2)	494	(2.3)	m	m
	United States	502	(7.2)	494	(3.2)	m	m	500	(3.7)	-2.1	(9.5)
	OECD average - 23	501	(0.7)	497	(0.6)	495	(0.7)	499	(0.6)	-1	(1.4)
	OECD average - 26	495	(0.8)	497	(0.6)	490	(0.7)	496	(0.5)	1	(1.3)
Partners	Albania	348	(2.9)	m	m	m	m	385	(4.0)	**36.6**	(7.0)
	Argentina	411	(8.6)	m	m	374	(6.9)	398	(4.6)	-12.9	(10.9)
	Azerbaijan	m	m	m	m	353	(3.4)	362	(3.3)	m	m
	Brazil	396	(3.0)	405	(4.6)	393	(4.0)	412	(2.7)	**16.1**	(6.4)
	Bulgaria	432	(4.8)	m	m	404	(6.5)	429	(6.7)	-2.6	(9.6)
	Colombia	m	m	m	m	385	(4.9)	413	(3.7)	m	m
	Croatia	m	m	m	m	476	(2.7)	476	(2.9)	m	m
	Hong Kong-China	522	(3.1)	509	(3.6)	533	(2.4)	533	(2.1)	11.4	(6.2)
	Indonesia	369	(3.9)	381	(3.3)	391	(5.8)	402	(3.7)	**32.6**	(7.3)
	Jordan	m	m	m	m	400	(3.3)	405	(3.3)	m	m
	Kyrgyzstan	m	m	m	m	284	(3.4)	314	(3.2)	m	m
	Latvia	458	(4.9)	489	(3.5)	479	(3.6)	484	(3.0)	**25.9**	(7.5)
	Liechtenstein	482	(4.0)	525	(3.7)	507	(4.0)	499	(2.8)	**17.5**	(7.0)
	Lithuania	m	m	m	m	470	(3.0)	468	(2.4)	m	m
	Macao-China	m	m	497	(2.2)	492	(1.1)	487	(0.9)	m	m
	Montenegro	m	m	m	m	392	(1.2)	408	(1.7)	m	m
	Peru	327	(4.6)	m	m	m	m	370	(4.0)	**43.0**	(7.8)
	Qatar	m	m	m	m	312	(1.2)	372	(0.8)	m	m
	Romania	427	(3.5)	m	m	396	(4.5)	424	(4.1)	-2.3	(7.3)
	Russian Federation	462	(4.1)	442	(3.8)	439	(4.2)	459	(3.3)	-2.5	(7.2)
	Serbia	m	m	411	(3.2)	401	(3.2)	442	(2.4)	m	m
	Chinese Taipei	m	m	m	m	507	(4.1)	495	(2.6)	m	m
	Thailand	428	(3.0)	421	(2.7)	418	(2.5)	421	(2.6)	-6.4	(6.3)
	Tunisia	m	m	375	(2.8)	380	(3.9)	404	(2.9)	m	m
	Uruguay	m	m	436	(3.4)	413	(3.3)	426	(2.6)	m	m

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