Annex A

PISA 2015 TECHNICAL BACKGROUND

All tables in Annex A are available on line

Annex A1: Indices from the student questionnaire

Annex A2: The PISA target population, the PISA samples and the definition of schools
http://dx.doi.org/10.1787/888933433129

Annex A3: Technical notes on analyses in this volume

Annex A4: Quality assurance

Annex A5: Changes in the administration and scaling of PISA 2015 and implications for trends analyses

Annex A6: The PISA 2015 field trial mode-effect study

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

Note regarding CABA (Argentina)
CABA (Argentina) refers to the Ciudad Autónoma de Buenos Aires, Argentina.

Note regarding FYROM
FYROM refers to the Former Yugoslav Republic of Macedonia.

Notes regarding Cyprus

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

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

A note regarding Israel

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

ANNEX A1
INDICES FROM THE STUDENT QUESTIONNAIRE

Explanation of the indices

This section explains the indices derived from the PISA 2015 student questionnaires used in this volume.

Several PISA measures reflect indices that summarise responses from students, their parents, teachers 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. The *PISA 2015 Assessment and Analytical Framework* (OECD, 2016) provides an in-depth description of this conceptual framework. 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 2015 Technical Report* (OECD, forthcoming).

There are three types of indices: simple indices, new scale indices, and trend 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-08 codes into "Highest parents' socio-economic index (HISEI)" or teacher-student ratio based on information from the school questionnaire.

New and trend scale indices are the variables constructed through the scaling of multiple items. Unless otherwise indicated, the index was scaled using a two-parameter item response model (a generalised partial credit model was used in the case of items with more than two categories) and values of the index correspond to Warm likelihood estimates (WLE) (Warm, 1985). For details on how each scale index was constructed, see the *PISA 2015 Technical Report* (OECD, forthcoming). In general, the scaling was done in three stages:

1. The item parameters were estimated from equally-weighted samples of students from all countries and economies; only cases with a minimum number of three valid responses to items that are part of the index were included. In the case of **trend indices**, a common calibration linking procedure was used: countries/economies that participated in both PISA 2006 and PISA 2015 contributed both samples to the calibration of item parameters; each cycle, and, within each cycle, each country/economy contributed equally to the estimation.
2. The estimates were computed for all students and all schools by anchoring the item parameters obtained in the preceding step.
3. For **new scale indices**, the Warm likelihood estimates were then standardised so that the mean of the index value for the OECD student population was zero and the standard deviation was one (countries being given equal weight in the standardisation process). **Trend indices** were equated so that the mean and standard deviation across OECD countries of rescaled PISA 2006 estimates and of the original estimates included in the PISA 2006 database matched. Trend indices are therefore reported on the same scale as used originally in PISA 2006, so that values can be directly compared to those included in the PISA 2006 database.

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. 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, on average, than respondents in OECD countries did. Terms enclosed in brackets < > in the following descriptions were replaced in the national versions of the student, school and parent questionnaires by the appropriate national equivalent. For example, the term <qualification at ISCED level 5A> was translated in the United States into "Bachelor's degree, post-graduate certificate program, Master's degree program or first professional degree program". Similarly the term <classes in the language of assessment> in Luxembourg was translated into "German classes" or "French classes", depending on whether students received the German or French version of the assessment instruments.

In addition to simple and scaled indices described in this annex, there are a number of variables from the questionnaires that were used in this volume and 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 and "SC" for the items in the school questionnaire. All the context questionnaires, and the PISA international database, including all variables, are available through www.oecd.org/pisa.

Student-level simple indices

Student age

The age of a student (AGE) was calculated as the difference between the year and month of the testing and the year and month of a student's birth. Data on student's age were obtained from both the questionnaire (ST003) and the student tracking forms. If the month of testing was not known for a particular student, the median month for that country was used in the calculation.

Parents' level of education

Students' responses on questions ST005, ST006, ST007 and ST008 regarding parental education were classified using ISCED 1997 (OECD, 1999). Indices on parental education were constructed by recoding educational qualifications into the following categories: (0) None, (1) <ISCED level 1> (primary education), (2) <ISCED level 2> (lower secondary), (3) <ISCED Level 3B or 3C> (vocational/pre-vocational upper secondary), (4) <ISCED level 3A> (general upper secondary) and/or <ISCED level 4> (non-tertiary post-secondary), (5) <ISCED level 5B> (vocational tertiary) and (6) <ISCED level 5A> and/or <ISCED level 6> (theoretically oriented tertiary and post-graduate). Indices with these categories were provided for a student's mother (MISCED) and father (FISCED). In addition, the index of highest education level of parents (HISCED) corresponds to the higher ISCED level of either parent. The index of highest education level of parents was also recoded into estimated number of years of schooling (PARED). The correspondence between education levels and years of schooling is available in the *PISA 2015 Technical Report* (OECD, forthcoming).

Parents' highest occupational status

Occupational data for both the student's father and the student's mother were obtained from responses to open-ended questions. The responses were coded to four-digit ISCO codes (ILO, 2007) and then mapped to the international socio-economic index of occupational status (ISEI) (Ganzeboom and Treiman, 2003). In PISA 2015, as in PISA 2012, the new ISCO and ISEI in their 2008 version were used rather than the 1988 versions that had been applied in the previous four cycles (Ganzeboom, 2010). Three indices were calculated based on this information: father's occupational status (BFMJ2); mother's occupational status (BMMJ1); and the highest occupational status of parents (HISEI) which corresponds to the higher ISEI score of either parent or to the only available parent's ISEI score. For all three indices, higher ISEI scores indicate higher levels of occupational status.

Immigrant background

The PISA database contains three country-specific variables relating to the students' country of birth, their mother and father (COBN_S, COBN_M, and COBN_F). The items ST019Q01TA, ST019Q01TB and ST019Q01TC were recoded into the following categories: (1) country of birth is the same as country of assessment and (2) other. The index of immigrant background (IMMIG) was calculated from these variables with the following categories: (1) non-immigrant students (those students who had at least one parent born in the country), (2) second-generation immigrant students (those born in the country of assessment but whose parent[s] were born in another country) and (3) first-generation immigrant students (those students 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 were assigned missing values for this variable.

Language spoken at home

Students indicated what language they usually speak at home (ST022), and the database includes a derived variable (LANGN) containing a country-specific code for each language. In addition, an internationally comparable variable (ST022Q01TA) was derived from this information with the following categories: (1) language at home is the same as the language of assessment for that student and (2) language at home is another language.

Student-level scale indices

New scale indices

Achievement motivation

The index of achievement motivation (MOTIVAT) was constructed using students' responses to a new question developed for PISA 2015 (ST119). Students reported, on a four-point Likert scale with the answering categories "strongly disagree", "disagree", "agree", and "strongly agree", their agreement with the following statements: I want top grades in most or all of my courses; I want to be able to select from among the best opportunities available when I graduate; I want to be the best, whatever I do; I see myself as an ambitious person; I want to be one of the best students in my class. Higher values indicate that students have greater achievement motivation.

Scaling of indices related to the PISA index of economic social and cultural status

The PISA index of economic, social and cultural status (ESCS) was derived, as in previous cycles, from three variables related to family background: parents' highest level of education (PARED), parents' highest occupation status (HISEI), and home possessions (HOMEPOS), including books in the home. PARED and HISEI are simple indices, described above. HOMEPOS is a proxy measure for family wealth.

Household possessions

In PISA 2015, students reported the availability of 16 household items at home (ST011), including three country-specific household items that were seen as appropriate measures of family wealth within the country's context. In addition, students reported the amount of possessions and books at home (ST012, ST013).

HOMEPOS is a summary index of all household and possession items (ST011, ST012 and ST013). The home possessions scale for PISA 2015 was computed differently than in the previous cycles, to align the IRT model to the one used for all cognitive and non-cognitive scales. Categories for the number of books in the home are unchanged in PISA 2015. The ST011-Items (1="yes", 2="no") were reverse-coded so that a higher level indicates the presence of the indicator.

Computation of ESCS

For the purpose of computing the PISA index of economic, social and cultural status (ESCS), values for students with missing PARED, HISEI or HOMEPOS were imputed with predicted values plus a random component based on a regression on the other two variables. If there were missing data on more than one of the three variables, ESCS was not computed and a missing value was assigned for ESCS.

The PISA index of economic, social and cultural status was derived from a principal component analysis of standardised variables (each variable has an OECD mean of zero and a standard deviation of one), taking the factor scores for the first principal component as measures of the PISA index of economic, social and cultural status. All countries and economies (both OECD and partner countries/economies) contributed equally to the principal component analysis, while in previous cycles, the principal component analysis was based on OECD countries only. However, for the purpose of reporting the ESCS scale has been transformed with zero being the score of an average OECD student and one being the standard deviation across equally weighted OECD countries.

Principal component analysis was also performed for each participating country or economy separately, to determine to what extent the components of the index operate in similar ways across countries or economy.

Response rate for variables about money experiences

Chapters 5 and 6 in this volume report several analyses about students' experience with money. In some countries and economies the response rate to questions about money experiences is relatively low. Table A1.1 reports the response rate for the relevant questions in the money management questionnaire. The last column of Table A1.1 reports the average response rate across all questions in the table.

Unless otherwise indicated, no adjustment is made for non-response to questionnaires in analyses included in this volume. The reported percentages and estimates refer to the proportion of the sample with valid responses to the corresponding questionnaire items. However, for each country and economy, results based on variables in the money management questionnaire are reported only when the average response rate to all money questions in the country/economy is at least 70%.

Tables A1.2a to 2d report how the probability that students give a valid response to any money management question varies with student characteristics, like gender, socio-economic status, immigrant background, performance in mathematics and whether the student completed the cognitive assessment. The probability of responding to the money management questions varies according to gender, socio-economic status, immigrant background and performance in mathematics in different ways across countries and economies. In most countries and economies, however, students who completed the cognitive assessment were more likely to reply to the money management questions, which were presented at the end of the cognitive booklets.

[Part 1/1]

Table A1.1 Weighted share of students responding to questions in the money management questionnaire

Percentage of non-missing observations, by questionnaire item

		Response rate													
		Discussing money matters with parents		Discussing money matters with friends		Holding a bank account		Holding a prepaid debit card		Receiving money from an allowance or pocket money for regularly doing chores at home		Receiving money from an allowance or pocket money, without having to do any chores		Receiving money from working outside school hours (e.g. a holiday job, part-time work)	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	79.1	(0.7)	78.6	(0.7)	78.3	(0.7)	76.1	(0.7)	74.3	(0.7)	72.0	(0.7)	74.0	(0.7)
OECD	Belgium (Flemish)	74.8	(2.5)	74.2	(2.5)	73.3	(2.5)	72.1	(2.5)	71.6	(2.3)	71.1	(2.4)	70.8	(2.4)
OECD	Canadian provinces	92.2	(0.8)	92.0	(0.8)	91.7	(0.8)	88.1	(0.9)	88.5	(1.0)	86.9	(1.0)	88.4	(1.0)
OECD	Chile	84.6	(1.3)	83.9	(1.3)	82.9	(1.4)	81.8	(1.4)	80.4	(1.3)	79.6	(1.3)	79.7	(1.3)
OECD	Italy	77.9	(1.5)	77.6	(1.5)	76.0	(1.5)	76.0	(1.6)	74.7	(1.4)	74.5	(1.5)	73.8	(1.4)
OECD	Netherlands	95.9	(1.0)	95.7	(1.0)	95.6	(1.0)	93.9	(1.1)	93.1	(1.1)	92.8	(1.0)	93.6	(1.0)
OECD	Poland	95.7	(0.6)	95.4	(0.6)	94.8	(0.7)	93.4	(0.7)	90.1	(0.7)	88.7	(0.8)	88.0	(0.8)
OECD	Slovak Republic	83.2	(1.3)	81.2	(1.4)	82.7	(1.3)	78.4	(1.3)	77.9	(1.6)	76.7	(1.5)	76.4	(1.5)
OECD	Spain	89.7	(1.0)	88.7	(1.0)	87.7	(1.1)	85.1	(1.2)	82.5	(1.2)	81.8	(1.3)	81.9	(1.2)
OECD	United States	89.4	(1.1)	88.4	(1.2)	88.4	(1.2)	87.3	(1.2)	87.5	(1.2)	85.5	(1.3)	85.2	(1.3)
	OECD average-10	86.3	(0.4)	85.6	(0.4)	85.1	(0.4)	83.2	(0.4)	82.1	(0.4)	81.0	(0.4)	81.2	(0.4)
Partners	Brazil	40.1	(1.3)	38.9	(1.3)	38.2	(1.4)	35.9	(1.3)	35.2	(1.3)	33.5	(1.2)	33.8	(1.3)
Partners	B-S-J-G (China)	94.5	(1.0)	94.2	(1.0)	93.5	(1.1)	91.1	(1.2)	91.6	(1.0)	88.9	(1.1)	90.2	(1.1)
Partners	Lithuania	93.7	(0.9)	92.4	(0.8)	93.0	(0.9)	89.0	(1.0)	89.1	(0.9)	87.7	(1.0)	87.5	(1.0)
Partners	Peru	58.1	(2.1)	57.1	(2.1)	52.9	(2.2)	51.6	(2.2)	51.5	(2.1)	50.8	(2.1)	51.6	(2.1)
Partners	Russia	73.5	(2.4)	72.3	(2.4)	71.0	(2.5)	71.2	(2.5)	69.7	(2.5)	69.3	(2.4)	69.8	(2.4)

		Response rate													
		Receiving money from working in a family business		Receiving money from occasional informal jobs (e.g. baby-sitting or gardening)		Receiving gifts of money from friends or relatives		Receiving money from selling things (e.g. at local markets or on eBay)		Spending behaviour		Saving behaviour		Average across questionnaire items presented in the table	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	71.3	(0.7)	71.3	(0.7)	73.9	(0.8)	71.4	(0.7)	78.5	(0.7)	77.2	(0.7)	75.1	(0.7)
OECD	Belgium (Flemish)	69.3	(2.3)	69.3	(2.4)	70.5	(2.4)	69.4	(2.3)	74.4	(2.5)	72.6	(2.5)	71.8	(2.4)
OECD	Canadian provinces	86.5	(1.0)	87.4	(1.0)	89.4	(1.0)	87.2	(1.0)	92.0	(0.8)	91.4	(0.8)	89.3	(0.9)
OECD	Chile	79.1	(1.3)	79.0	(1.3)	81.1	(1.3)	79.5	(1.3)	84.1	(1.2)	82.5	(1.3)	81.4	(1.3)
OECD	Italy	74.1	(1.4)	73.8	(1.4)	74.7	(1.5)	73.0	(1.5)	76.9	(1.6)	75.4	(1.6)	75.3	(1.4)
OECD	Netherlands	92.0	(1.0)	92.0	(1.0)	93.3	(1.1)	92.2	(1.0)	95.5	(1.0)	95.3	(1.0)	93.9	(1.0)
OECD	Poland	85.5	(0.9)	86.2	(0.8)	89.9	(0.8)	86.4	(0.9)	95.8	(0.5)	94.8	(0.7)	91.2	(0.6)
OECD	Slovak Republic	75.1	(1.5)	75.8	(1.5)	77.4	(1.5)	74.2	(1.5)	83.5	(1.3)	82.9	(1.3)	78.9	(1.3)
OECD	Spain	81.5	(1.2)	80.9	(1.2)	83.2	(1.1)	80.4	(1.3)	89.5	(1.0)	88.0	(1.1)	84.7	(1.1)
OECD	United States	84.2	(1.3)	84.6	(1.3)	87.1	(1.2)	84.8	(1.3)	89.5	(1.1)	88.4	(1.2)	86.9	(1.2)
	OECD average-10	79.8	(0.4)	80.0	(0.4)	82.0	(0.4)	79.8	(0.4)	86.0	(0.4)	84.8	(0.4)	82.8	(0.4)
Partners	Brazil	33.0	(1.2)	32.4	(1.2)	33.3	(1.2)	32.2	(1.2)	39.0	(1.3)	36.9	(1.3)	35.6	(1.2)
Partners	B-S-J-G (China)	87.8	(1.1)	87.7	(1.1)	90.1	(1.1)	88.7	(1.1)	94.2	(1.0)	93.8	(1.1)	91.3	(1.0)
Partners	Lithuania	86.5	(1.0)	86.6	(1.0)	87.9	(1.0)	85.8	(1.1)	93.7	(0.8)	93.1	(0.9)	89.7	(0.8)
Partners	Peru	51.3	(2.1)	50.5	(2.2)	51.2	(2.1)	50.0	(2.1)	56.4	(2.1)	53.3	(2.2)	52.8	(2.1)
Partners	Russia	69.0	(2.5)	68.9	(2.5)	69.6	(2.5)	68.9	(2.5)	73.2	(2.4)	71.9	(2.5)	70.6	(2.4)

StatLink http://dx.doi.org/10.1787/888933486236

[Part 1/1]

Table A1.2a Likelihood of a valid response about discussing money matters with parents or friends

		Increased likelihood of giving a valid response to the question on discussing money matters with parents													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.19	(0.25)	1.07	(0.14)	0.80	(0.20)	**0.47**	(0.18)	**0.26**	(0.11)	**2.98**	(0.71)	**5.80**	(2.55)
OECD	Canadian provinces	0.56	(0.22)	1.49	(0.35)	1.02	(0.43)	0.65	(0.50)	0.91	(1.00)	**3.72**	(1.92)	**35.76**	(39.23)
OECD	Chile	0.97	(0.19)	0.94	(0.08)	1.89	(1.43)	0.68	(0.20)	1.23	(1.33)	**2.74**	(0.59)	2.96	(1.70)
OECD	Italy	1.34	(0.29)	0.99	(0.13)	1.37	(0.51)	**0.45**	(0.17)	**0.21**	(0.11)	**2.17**	(0.58)	**10.05**	(4.96)
OECD	Netherlands	0.20	(0.26)	0.42	(0.29)	3.05	(3.16)	0.95	(1.49)	c	c	**143.14**	(303.30)	27.49	(188.48)
OECD	Poland	0.85	(0.25)	0.86	(0.18)	c	c	1.04	(0.58)	0.62	(0.58)	**2.57**	(1.19)	**23.10**	(12.57)
OECD	Slovak Republic	1.36	(0.29)	**0.63**	(0.09)	c	c	0.84	(0.22)	0.64	(0.41)	**2.48**	(0.56)	2.52	(1.98)
OECD	Spain	0.78	(0.18)	0.94	(0.11)	1.16	(0.40)	1.09	(0.29)	1.47	(1.07)	**2.80**	(0.59)	**5.88**	(2.74)
OECD	United States	**1.76**	(0.44)	**1.30**	(0.15)	**2.22**	(0.65)	0.71	(0.29)	0.59	(0.63)	**4.58**	(2.54)	2.74	(1.67)
	OECD average-10	1.00	(0.09)	0.96	(0.06)	1.65	(0.52)	0.77	(0.20)	0.74	(0.27)	18.57	(33.70)	12.92	(21.45)
Partners	Brazil	1.04	(0.09)	**1.22**	(0.06)	c	c	**0.70**	(0.09)	0.49	(0.29)	0.98	(0.10)	2.08	(1.66)
Partners	B-S-J-G (China)	1.18	(0.30)	1.16	(0.23)	c	c	0.72	(0.36)	0.73	(0.75)	**5.60**	(4.04)	**10.98**	(8.25)
Partners	Lithuania	**0.39**	(0.16)	0.91	(0.22)	**3.50**	(2.00)	**2.60**	(1.04)	1.20	(1.16)	**4.80**	(1.48)	3.48	(3.10)
Partners	Peru	**1.44**	(0.22)	**1.27**	(0.09)	c	c	0.73	(0.13)	c	c	0.71	(0.17)	7.70	(13.99)
Partners	Russia	1.34	(0.24)	**0.72**	(0.09)	**2.20**	(0.53)	0.60	(0.22)	0.48	(0.25)	**1.94**	(0.41)	1.99	(0.85)
		Increased likelihood of giving a valid response to the question on discussing money matters with friends													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.11	(0.22)	1.07	(0.14)	0.74	(0.20)	0.59	(0.20)	**0.35**	(0.13)	**3.11**	(0.72)	**4.67**	(1.95)
OECD	Canadian provinces	0.55	(0.18)	**1.41**	(0.23)	1.25	(0.54)	0.62	(0.38)	0.93	(1.01)	**4.13**	(1.88)	**23.99**	(20.52)
OECD	Chile	1.06	(0.19)	0.96	(0.08)	1.69	(1.22)	0.71	(0.19)	1.41	(1.55)	**2.38**	(0.52)	**3.10**	(1.74)
OECD	Italy	1.30	(0.28)	1.05	(0.15)	1.13	(0.43)	**0.44**	(0.18)	**0.21**	(0.11)	**2.06**	(0.53)	**12.32**	(6.44)
OECD	Netherlands	**0.07**	(0.09)	0.69	(0.31)	3.11	(1.99)	1.62	(2.29)	c	c	**18.14**	(23.05)	33.92	(81.12)
OECD	Poland	1.06	(0.28)	0.87	(0.18)	c	c	1.25	(0.58)	0.84	(0.76)	**4.14**	(1.76)	1.90	(3.34)
OECD	Slovak Republic	**1.54**	(0.30)	**0.76**	(0.08)	c	c	1.19	(0.27)	0.87	(0.48)	**2.41**	(0.47)	2.00	(1.55)
OECD	Spain	0.81	(0.16)	1.00	(0.11)	0.93	(0.31)	1.30	(0.36)	1.80	(1.35)	**2.86**	(0.54)	**5.38**	(2.30)
OECD	United States	1.37	(0.35)	1.24	(0.14)	**2.19**	(0.65)	1.06	(0.39)	1.01	(1.03)	**4.91**	(3.48)	1.76	(1.16)
	OECD average-10	0.99	(0.08)	1.01	(0.06)	**1.58**	(0.36)	0.98	(0.28)	0.93	(0.33)	**4.91**	(2.61)	**9.89**	(9.34)
Partners	Brazil	1.05	(0.10)	**1.23**	(0.06)	c	c	**0.73**	(0.10)	0.51	(0.31)	1.05	(0.10)	1.98	(1.58)
Partners	B-S-J-G (China)	1.28	(0.35)	0.96	(0.18)	c	c	0.71	(0.34)	0.91	(0.92)	**6.79**	(3.99)	**6.29**	(3.56)
Partners	Lithuania	**0.39**	(0.13)	0.82	(0.16)	1.56	(1.09)	**2.49**	(0.90)	1.57	(1.31)	**3.09**	(0.99)	**7.15**	(6.89)
Partners	Peru	**1.41**	(0.20)	**1.25**	(0.09)	c	c	0.78	(0.13)	c	c	0.83	(0.18)	3.64	(4.65)
Partners	Russia	1.20	(0.17)	**0.73**	(0.09)	**2.15**	(0.51)	0.66	(0.21)	0.57	(0.29)	**1.81**	(0.42)	1.87	(0.76)

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

StatLink http://dx.doi.org/10.1787/888933486247

[Part 1/1]

Table A1.2b Likelihood of a valid response about holding a bank account or a prepaid debit card

		Increased likelihood of giving a valid response to the question on holding a bank account													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.20	(0.23)	1.07	(0.14)	0.72	(0.22)	**0.37**	(0.13)	**0.19**	(0.08)	**3.23**	(0.82)	**6.72**	(2.80)
OECD	Canadian provinces	0.55	(0.17)	1.29	(0.25)	1.04	(0.47)	0.55	(0.34)	0.84	(0.96)	**4.92**	(2.12)	**24.67**	(22.61)
OECD	Chile	1.18	(0.22)	0.89	(0.07)	1.26	(0.99)	0.63	(0.16)	1.41	(1.54)	**2.66**	(0.58)	**3.41**	(1.83)
OECD	Italy	1.28	(0.25)	0.95	(0.12)	1.70	(0.61)	**0.50**	(0.17)	**0.25**	(0.12)	**2.11**	(0.56)	**5.83**	(2.65)
OECD	Netherlands	0.33	(0.26)	0.95	(0.72)	**3.30**	(1.72)	1.65	(2.35)	c	c	**78.90**	(126.37)	4.30	(4.72)
OECD	Poland	1.02	(0.30)	0.93	(0.17)	c	c	0.98	(0.46)	0.56	(0.43)	**3.96**	(1.69)	**12.81**	(6.39)
OECD	Slovak Republic	**1.63**	(0.32)	**0.61**	(0.09)	c	c	0.65	(0.19)	0.52	(0.30)	**1.78**	(0.38)	6.75	(7.22)
OECD	Spain	0.96	(0.21)	0.92	(0.09)	0.74	(0.30)	1.28	(0.36)	1.53	(0.98)	**2.43**	(0.45)	**5.72**	(3.08)
OECD	United States	**1.95**	(0.45)	**1.37**	(0.16)	**1.98**	(0.57)	0.91	(0.31)	0.68	(0.61)	**3.63**	(1.90)	2.37	(1.35)
OECD	OECD average-10	1.12	(0.09)	1.00	(0.09)	**1.54**	(0.32)	0.84	(0.28)	0.75	(0.28)	**11.51**	(14.05)	**8.06**	(2.85)
Partners	Brazil	1.13	(0.10)	**1.28**	(0.06)	c	c	**0.63**	(0.09)	0.40	(0.26)	0.93	(0.10)	0.48	(0.35)
Partners	B-S-J-G (China)	1.20	(0.34)	**1.42**	(0.26)	c	c	0.74	(0.31)	0.69	(0.49)	**4.06**	(2.32)	**380.49**	(951.52)
Partners	Lithuania	0.67	(0.20)	1.13	(0.27)	**3.12**	(1.66)	1.82	(0.79)	0.98	(0.92)	**3.05**	(0.85)	3.52	(2.96)
Partners	Peru	**1.48**	(0.18)	**1.17**	(0.08)	c	c	0.82	(0.14)	c	c	0.78	(0.16)	3.45	(4.42)
Partners	Russia	**1.50**	(0.27)	**0.74**	(0.08)	**2.65**	(0.49)	0.70	(0.22)	0.61	(0.32)	**1.75**	(0.39)	1.23	(0.56)

		Increased likelihood of giving a valid response to the question on holding a prepaid debit card													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.17	(0.21)	1.10	(0.13)	0.63	(0.17)	0.64	(0.21)	**0.34**	(0.13)	**3.97**	(1.00)	**3.42**	(1.18)
OECD	Canadian provinces	0.80	(0.18)	0.99	(0.16)	0.95	(0.26)	1.42	(0.51)	2.90	(2.42)	**2.52**	(0.81)	**5.79**	(2.91)
OECD	Chile	1.14	(0.21)	0.90	(0.07)	1.08	(0.85)	0.70	(0.18)	1.40	(1.30)	**2.50**	(0.55)	**3.49**	(1.91)
OECD	Italy	1.34	(0.23)	0.95	(0.12)	1.53	(0.53)	0.64	(0.21)	**0.31**	(0.14)	**2.03**	(0.43)	**5.19**	(2.62)
OECD	Netherlands	0.62	(0.24)	1.23	(0.43)	0.66	(0.39)	3.09	(1.93)	5.02	(12.36)	**10.67**	(5.45)	4.32	(3.78)
OECD	Poland	0.89	(0.22)	1.01	(0.19)	c	c	1.33	(0.53)	0.96	(0.66)	**2.86**	(0.95)	2.46	(4.42)
OECD	Slovak Republic	**1.35**	(0.19)	**0.75**	(0.09)	c	c	1.44	(0.30)	1.42	(0.75)	**1.45**	(0.27)	3.69	(2.86)
OECD	Spain	0.85	(0.17)	0.92	(0.07)	0.86	(0.26)	1.40	(0.33)	2.03	(1.20)	**2.09**	(0.44)	**4.06**	(1.67)
OECD	United States	**1.52**	(0.31)	**1.27**	(0.15)	**1.83**	(0.49)	1.14	(0.36)	1.21	(1.12)	**3.12**	(1.48)	2.21	(1.17)
OECD	OECD average-10	1.08	(0.07)	1.01	(0.06)	1.08	(0.18)	1.31	(0.24)	1.73	(1.42)	**3.47**	(0.66)	**3.85**	(0.91)
Partners	Brazil	1.14	(0.10)	**1.27**	(0.06)	c	c	**0.68**	(0.10)	0.46	(0.30)	1.02	(0.11)	0.66	(0.45)
Partners	B-S-J-G (China)	0.88	(0.19)	1.23	(0.16)	c	c	1.14	(0.39)	1.52	(0.87)	**3.62**	(1.50)	**289.82**	(592.75)
Partners	Lithuania	0.78	(0.16)	0.92	(0.14)	1.89	(1.01)	**2.83**	(0.88)	2.67	(1.98)	**2.32**	(0.60)	2.20	(1.61)
Partners	Peru	**1.38**	(0.17)	**1.17**	(0.07)	c	c	0.85	(0.14)	c	c	0.89	(0.18)	1.99	(2.03)
Partners	Russia	1.38	(0.25)	**0.76**	(0.08)	**2.80**	(0.50)	0.72	(0.19)	0.59	(0.27)	**1.80**	(0.39)	1.18	(0.51)

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

StatLink http://dx.doi.org/10.1787/888933486251

[Part 1/3]

Table A1.2c Likelihood of a valid response about money sources

		Increased likelihood of giving a valid response to the question on receiving money from an allowance or pocket money for regularly doing chores at home													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.31	(0.23)	1.05	(0.12)	1.02	(0.22)	0.78	(0.22)	**0.45**	(0.16)	**2.72**	(0.66)	**2.28**	(0.60)
	Canadian provinces	**0.54**	(0.12)	1.21	(0.16)	0.88	(0.22)	1.00	(0.38)	2.12	(2.21)	**2.02**	(0.69)	**12.08**	(7.28)
	Chile	1.11	(0.20)	0.97	(0.07)	1.93	(1.10)	0.76	(0.17)	1.73	(1.56)	**2.64**	(0.49)	1.65	(0.71)
	Italy	1.01	(0.20)	1.06	(0.14)	1.19	(0.38)	0.59	(0.17)	**0.34**	(0.15)	**2.17**	(0.54)	**6.48**	(2.79)
	Netherlands	0.96	(0.31)	1.13	(0.27)	2.05	(0.87)	2.48	(1.23)	3.11	(4.48)	**6.02**	(2.30)	1.67	(0.90)
	Poland	1.02	(0.17)	1.09	(0.14)	c	c	0.98	(0.28)	1.16	(0.57)	1.49	(0.33)	3.20	(5.31)
	Slovak Republic	**1.49**	(0.26)	**0.69**	(0.07)	c	c	1.14	(0.25)	1.00	(0.54)	**2.27**	(0.39)	2.92	(2.06)
	Spain	0.92	(0.14)	0.99	(0.07)	0.59	(0.19)	**1.59**	(0.37)	2.29	(1.29)	**2.07**	(0.38)	**4.11**	(1.58)
	United States	**1.49**	(0.30)	1.17	(0.11)	**2.37**	(0.58)	1.17	(0.39)	1.41	(1.41)	**3.09**	(1.37)	1.85	(0.85)
	OECD average-10	1.09	(0.07)	1.04	(0.05)	**1.43**	(0.23)	1.17	(0.17)	1.51	(0.63)	**2.72**	(0.33)	**4.03**	(1.10)
Partners	Brazil	1.10	(0.10)	**1.20**	(0.05)	c	c	**0.75**	(0.10)	0.46	(0.27)	1.18	(0.12)	0.97	(0.71)
	B-S-J-G (China)	1.12	(0.24)	1.12	(0.15)	c	c	1.08	(0.38)	1.74	(1.06)	**3.60**	(1.59)	**220.22**	(474.01)
	Lithuania	0.76	(0.15)	0.92	(0.15)	2.23	(1.20)	**2.43**	(0.58)	2.65	(1.95)	**1.93**	(0.44)	2.16	(1.51)
	Peru	**1.46**	(0.18)	**1.17**	(0.08)	c	c	0.86	(0.15)	c	c	0.96	(0.20)	0.79	(0.73)
	Russia	**1.40**	(0.23)	**0.74**	(0.08)	**2.05**	(0.42)	0.71	(0.21)	0.59	(0.27)	**2.09**	(0.37)	1.30	(0.55)

		Increased likelihood of giving a valid response to the question on receiving money from an allowance or pocket money, without having to do any chores													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.22	(0.23)	1.00	(0.11)	1.07	(0.25)	0.81	(0.22)	**0.50**	(0.17)	**2.81**	(0.70)	**2.04**	(0.55)
	Canadian provinces	**0.45**	(0.10)	1.08	(0.13)	0.99	(0.22)	1.28	(0.43)	2.32	(1.91)	**2.35**	(0.63)	**7.10**	(2.50)
	Chile	1.07	(0.18)	1.01	(0.08)	1.83	(0.82)	0.74	(0.17)	1.76	(1.93)	**2.75**	(0.52)	1.72	(0.65)
	Italy	1.05	(0.21)	1.06	(0.12)	0.96	(0.30)	0.59	(0.17)	**0.31**	(0.12)	**2.32**	(0.54)	**7.26**	(3.25)
	Netherlands	1.02	(0.35)	0.86	(0.26)	2.03	(0.99)	2.26	(1.12)	c	c	**7.90**	(3.28)	1.34	(0.67)
	Poland	1.06	(0.17)	0.91	(0.11)	c	c	1.28	(0.42)	1.86	(1.00)	**2.10**	(0.42)	2.16	(3.51)
	Slovak Republic	**1.53**	(0.23)	**0.75**	(0.07)	c	c	1.13	(0.24)	1.15	(0.63)	**1.99**	(0.31)	3.05	(2.25)
	Spain	0.91	(0.14)	0.99	(0.07)	0.68	(0.20)	1.42	(0.31)	2.71	(1.44)	**2.27**	(0.46)	**3.37**	(1.26)
	United States	1.34	(0.25)	1.11	(0.12)	**2.17**	(0.44)	1.33	(0.42)	1.54	(1.22)	**2.72**	(1.10)	1.62	(0.69)
	OECD average-10	1.07	(0.07)	0.97	(0.04)	**1.39**	(0.21)	1.20	(0.16)	1.52	(0.44)	**3.02**	(0.41)	**3.29**	(0.68)
Partners	Brazil	1.07	(0.11)	**1.20**	(0.06)	c	c	0.80	(0.11)	0.59	(0.39)	1.20	(0.13)	0.52	(0.41)
	B-S-J-G (China)	1.03	(0.21)	1.13	(0.11)	c	c	0.88	(0.27)	1.68	(0.88)	**2.67**	(1.03)	0.81	(2.56)
	Lithuania	0.90	(0.17)	1.08	(0.15)	2.57	(1.33)	**1.85**	(0.46)	2.31	(1.94)	**2.24**	(0.43)	1.57	(0.97)
	Peru	**1.48**	(0.18)	**1.18**	(0.08)	c	c	0.85	(0.15)	c	c	0.94	(0.19)	0.81	(0.75)
	Russia	**1.45**	(0.23)	**0.80**	(0.09)	**1.97**	(0.40)	0.73	(0.21)	0.64	(0.29)	**2.07**	(0.35)	1.23	(0.50)

		Increased likelihood of giving a valid response to the question on receiving money from working outside school hours (e.g. a holiday job, part-time work)													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.08	(0.19)	1.00	(0.11)	1.28	(0.30)	0.79	(0.21)	**0.48**	(0.15)	**2.71**	(0.67)	**1.91**	(0.56)
	Canadian provinces	0.65	(0.16)	1.14	(0.15)	1.45	(0.35)	1.13	(0.45)	3.24	(3.48)	**2.56**	(0.86)	**5.66**	(2.69)
	Chile	1.07	(0.19)	0.97	(0.08)	2.45	(1.15)	0.80	(0.18)	2.01	(2.23)	**2.58**	(0.49)	1.26	(0.52)
	Italy	1.08	(0.21)	1.09	(0.12)	0.86	(0.26)	0.77	(0.19)	**0.42**	(0.16)	**2.39**	(0.51)	**5.69**	(2.29)
	Netherlands	0.70	(0.27)	0.90	(0.35)	2.12	(1.20)	2.16	(1.12)	3.47	(8.39)	**10.23**	(3.94)	1.68	(0.89)
	Poland	1.10	(0.18)	1.07	(0.12)	c	c	1.16	(0.31)	1.87	(0.81)	1.44	(0.36)	2.65	(4.45)
	Slovak Republic	**1.48**	(0.23)	**0.74**	(0.07)	c	c	1.00	(0.21)	0.91	(0.43)	**1.88**	(0.33)	1.51	(1.16)
	Spain	1.01	(0.18)	1.00	(0.07)	0.58	(0.17)	1.43	(0.30)	2.47	(1.41)	**2.51**	(0.43)	**3.44**	(1.27)
	United States	1.21	(0.20)	1.10	(0.11)	**1.72**	(0.31)	1.29	(0.38)	1.30	(0.98)	**3.13**	(1.10)	1.70	(0.63)
	OECD average-10	1.04	(0.07)	1.00	(0.05)	**1.50**	(0.25)	1.17	(0.16)	1.80	(1.06)	**3.27**	(0.48)	**2.83**	(0.68)
Partners	Brazil	1.11	(0.11)	**1.19**	(0.06)	c	c	0.80	(0.10)	0.52	(0.31)	1.19	(0.12)	0.75	(0.53)
	B-S-J-G (China)	1.04	(0.20)	1.00	(0.11)	c	c	0.67	(0.23)	1.15	(0.63)	**3.79**	(1.49)	**172.44**	(340.29)
	Lithuania	1.07	(0.22)	1.08	(0.15)	**2.77**	(1.38)	**1.70**	(0.41)	1.92	(1.65)	**1.69**	(0.35)	1.63	(1.05)
	Peru	**1.44**	(0.19)	**1.18**	(0.08)	c	c	0.87	(0.16)	c	c	1.13	(0.23)	1.59	(1.65)
	Russia	**1.40**	(0.22)	**0.75**	(0.08)	**2.16**	(0.42)	0.84	(0.23)	0.68	(0.34)	**1.99**	(0.39)	1.13	(0.47)

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

StatLink http://dx.doi.org/10.1787/888933486266

[Part 2/3]

Table A1.2c Likelihood of a valid response about money sources

		Increased likelihood of giving a valid response to the question on receiving money from working in a family business													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.11	(0.19)	0.96	(0.10)	1.20	(0.27)	1.02	(0.26)	0.63	(0.20)	**2.59**	(0.62)	1.49	(0.42)
	Canadian provinces	**0.61**	(0.12)	1.03	(0.12)	0.99	(0.24)	1.25	(0.43)	3.04	(2.92)	**2.21**	(0.63)	**5.90**	(2.26)
	Chile	1.06	(0.18)	0.98	(0.08)	1.75	(0.98)	0.80	(0.17)	1.83	(2.31)	**2.50**	(0.45)	1.73	(0.74)
	Italy	1.04	(0.20)	1.05	(0.12)	1.17	(0.31)	**0.53**	(0.15)	**0.29**	(0.11)	**1.99**	(0.48)	**7.01**	(2.61)
	Netherlands	0.91	(0.25)	0.96	(0.27)	1.61	(0.85)	**2.27**	(0.86)	3.80	(5.09)	**7.55**	(2.63)	1.33	(0.74)
	Poland	1.14	(0.17)	1.09	(0.12)	c	c	1.02	(0.27)	1.67	(0.74)	**1.53**	(0.27)	2.72	(4.41)
	Slovak Republic	**1.39**	(0.21)	**0.77**	(0.08)	c	c	1.07	(0.22)	1.01	(0.47)	**1.99**	(0.33)	1.85	(1.20)
	Spain	1.01	(0.17)	0.99	(0.07)	0.64	(0.17)	1.46	(0.30)	2.20	(1.13)	**2.24**	(0.40)	**3.32**	(1.11)
	United States	1.16	(0.18)	1.09	(0.10)	**1.68**	(0.29)	1.34	(0.39)	1.48	(0.95)	**2.66**	(0.94)	1.74	(0.70)
	OECD average-10	1.05	(0.06)	0.99	(0.04)	1.29	(0.20)	1.20	(0.13)	1.77	(0.73)	**2.81**	(0.34)	**3.01**	(0.67)
Partners	Brazil	1.08	(0.11)	**1.22**	(0.06)	c	c	0.79	(0.10)	0.54	(0.35)	**1.27**	(0.13)	0.50	(0.40)
	B-S-J-G (China)	1.08	(0.18)	1.05	(0.10)	c	c	0.87	(0.24)	2.05	(1.04)	**2.90**	(1.02)	**204.57**	(408.42)
	Lithuania	1.02	(0.19)	1.12	(0.14)	2.36	(1.16)	1.54	(0.37)	1.99	(1.72)	**1.69**	(0.29)	1.86	(1.17)
	Peru	**1.45**	(0.19)	**1.17**	(0.08)	c	c	0.83	(0.14)	c	c	1.06	(0.21)	0.73	(0.68)
	Russia	**1.47**	(0.21)	**0.78**	(0.09)	**2.09**	(0.41)	0.74	(0.20)	0.64	(0.32)	**2.16**	(0.36)	1.09	(0.42)

		Increased likelihood of giving a valid response to the question on receiving money from occasional informal jobs (e.g. baby-sitting or gardening)													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.10	(0.18)	1.00	(0.10)	1.37	(0.28)	0.91	(0.23)	0.56	(0.18)	**2.58**	(0.59)	1.45	(0.41)
	Canadian provinces	**0.39**	(0.09)	1.15	(0.15)	1.18	(0.29)	1.18	(0.41)	2.49	(2.31)	**3.03**	(0.91)	**6.48**	(2.62)
	Chile	1.10	(0.19)	0.94	(0.08)	1.77	(0.99)	0.82	(0.19)	2.18	(2.49)	**2.54**	(0.46)	1.60	(0.69)
	Italy	1.06	(0.20)	1.04	(0.12)	1.02	(0.31)	0.63	(0.18)	**0.38**	(0.16)	**1.98**	(0.43)	**6.59**	(2.46)
	Netherlands	0.87	(0.28)	1.20	(0.31)	1.88	(0.98)	**2.36**	(1.01)	c	c	**6.53**	(2.12)	1.31	(0.64)
	Poland	1.09	(0.15)	1.03	(0.11)	c	c	1.10	(0.29)	2.11	(1.00)	**1.67**	(0.37)	**4.22**	(1.15)
	Slovak Republic	**1.53**	(0.24)	**0.78**	(0.07)	c	c	1.18	(0.23)	1.06	(0.54)	**2.25**	(0.36)	2.82	(2.00)
	Spain	0.92	(0.14)	1.04	(0.07)	0.68	(0.18)	**1.57**	(0.33)	2.33	(1.17)	**2.35**	(0.43)	**2.95**	(1.01)
	United States	1.33	(0.22)	**1.22**	(0.12)	**1.74**	(0.35)	1.52	(0.43)	2.27	(2.24)	**2.67**	(0.97)	1.55	(0.63)
	OECD average-10	1.04	(0.06)	1.04	(0.05)	**1.38**	(0.22)	1.25	(0.15)	1.67	(0.55)	**2.84**	(0.30)	**3.22**	(0.51)
Partners	Brazil	1.10	(0.10)	**1.20**	(0.06)	c	c	0.80	(0.10)	0.55	(0.33)	1.19	(0.12)	0.51	(0.40)
	B-S-J-G (China)	0.95	(0.17)	1.07	(0.11)	c	c	0.82	(0.22)	1.94	(0.95)	**2.92**	(1.01)	0.74	(2.23)
	Lithuania	0.94	(0.19)	1.10	(0.15)	2.44	(1.21)	**1.69**	(0.40)	2.12	(1.91)	**1.73**	(0.32)	1.75	(1.13)
	Peru	**1.37**	(0.18)	**1.16**	(0.08)	c	c	0.90	(0.16)	c	c	1.03	(0.20)	0.75	(0.68)
	Russia	**1.47**	(0.22)	**0.77**	(0.08)	**1.95**	(0.39)	0.74	(0.20)	0.63	(0.29)	**2.13**	(0.36)	1.19	(0.48)

		Increased likelihood of giving a valid response to the question on receiving gifts of money from friends or relatives													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.19	(0.21)	1.05	(0.12)	1.26	(0.27)	0.94	(0.27)	0.57	(0.20)	**2.89**	(0.65)	1.44	(0.44)
	Canadian provinces	**0.49**	(0.12)	1.20	(0.18)	1.10	(0.32)	1.28	(0.55)	3.82	(4.44)	**3.14**	(1.19)	**7.63**	(3.62)
	Chile	1.01	(0.18)	0.94	(0.07)	1.27	(0.98)	0.73	(0.17)	1.62	(1.55)	**2.62**	(0.52)	2.87	(1.56)
	Italy	1.01	(0.21)	1.09	(0.13)	1.24	(0.40)	0.61	(0.18)	**0.31**	(0.12)	**2.36**	(0.56)	**5.79**	(2.35)
	Netherlands	0.60	(0.24)	1.03	(0.30)	1.57	(0.78)	**2.68**	(1.22)	6.36	(14.49)	**6.08**	(2.47)	2.59	(1.36)
	Poland	0.98	(0.16)	1.11	(0.15)	c	c	1.15	(0.39)	1.55	(0.80)	**2.07**	(0.51)	2.59	(4.55)
	Slovak Republic	**1.48**	(0.25)	**0.73**	(0.08)	c	c	1.18	(0.25)	1.10	(0.64)	**2.27**	(0.42)	2.09	(1.67)
	Spain	0.98	(0.15)	0.96	(0.07)	0.78	(0.22)	**1.70**	(0.43)	2.60	(1.44)	**2.55**	(0.47)	**2.64**	(0.95)
	United States	1.33	(0.27)	1.22	(0.13)	**2.27**	(0.48)	1.29	(0.39)	1.48	(1.49)	**3.45**	(1.54)	1.64	(0.79)
	OECD average-10	1.01	(0.07)	1.04	(0.05)	**1.36**	(0.21)	1.29	(0.17)	2.16	(1.71)	**3.05**	(0.38)	**3.25**	(0.77)
Partners	Brazil	1.04	(0.10)	**1.22**	(0.06)	c	c	0.79	(0.10)	0.54	(0.34)	1.17	(0.12)	0.37	(0.27)
	B-S-J-G (China)	0.98	(0.19)	1.10	(0.13)	c	c	0.82	(0.24)	1.89	(1.25)	**4.00**	(1.56)	**212.98**	(440.57)
	Lithuania	0.87	(0.20)	1.14	(0.17)	2.78	(1.48)	**1.89**	(0.50)	2.16	(1.90)	**2.39**	(0.51)	1.45	(0.93)
	Peru	**1.38**	(0.17)	**1.18**	(0.08)	c	c	0.89	(0.15)	c	c	1.10	(0.20)	1.06	(1.08)
	Russia	1.28	(0.22)	**0.80**	(0.09)	**1.97**	(0.40)	0.79	(0.22)	0.67	(0.33)	**2.13**	(0.39)	1.21	(0.48)

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

StatLink http://dx.doi.org/10.1787/888933486266

[Part 3/3]

Table A1.2c Likelihood of a valid response about money sources

		Increased likelihood of giving a valid response to the question on receiving money from selling things (e.g. at local markets or on eBay)													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.18	(0.20)	1.00	(0.10)	1.18	(0.24)	1.03	(0.26)	0.66	(0.23)	**2.68**	(0.63)	1.39	(0.40)
OECD	Canadian provinces	**0.64**	(0.14)	1.06	(0.13)	1.28	(0.29)	1.24	(0.41)	2.66	(2.45)	**2.48**	(0.77)	**4.94**	(1.84)
OECD	Chile	1.09	(0.19)	0.96	(0.08)	2.48	(1.34)	0.82	(0.18)	2.12	(2.37)	**2.40**	(0.44)	1.27	(0.55)
OECD	Italy	0.92	(0.17)	1.06	(0.11)	1.04	(0.32)	0.62	(0.18)	**0.42**	(0.17)	**1.84**	(0.41)	**6.65**	(2.58)
OECD	Netherlands	0.92	(0.31)	1.24	(0.33)	1.36	(0.72)	2.32	(1.02)	4.32	(8.34)	**6.19**	(2.14)	1.83	(1.09)
OECD	Poland	1.07	(0.16)	1.15	(0.14)	c	c	1.13	(0.30)	1.80	(0.83)	**1.73**	(0.32)	2.60	(4.49)
OECD	Slovak Republic	**1.59**	(0.26)	**0.76**	(0.07)	c	c	1.25	(0.23)	1.10	(0.49)	**2.21**	(0.37)	1.98	(1.60)
OECD	Spain	1.10	(0.18)	1.03	(0.07)	0.62	(0.17)	1.49	(0.31)	2.08	(1.02)	**2.36**	(0.40)	**2.89**	(1.01)
OECD	United States	**1.51**	(0.27)	1.13	(0.11)	**1.79**	(0.34)	1.55	(0.43)	1.80	(1.37)	**3.11**	(1.09)	1.28	(0.49)
OECD	OECD average-10	1.11	(0.07)	1.04	(0.05)	**1.39**	(0.23)	**1.27**	(0.15)	1.88	(1.03)	**2.78**	(0.30)	**2.76**	(0.66)
Partners	Brazil	1.07	(0.10)	**1.21**	(0.05)	c	c	0.82	(0.11)	0.51	(0.29)	**1.26**	(0.13)	0.34	(0.25)
Partners	B-S-J-G (China)	1.03	(0.16)	1.14	(0.11)	c	c	0.83	(0.21)	1.48	(0.66)	**3.03**	(1.00)	0.77	(2.26)
Partners	Lithuania	0.98	(0.17)	1.01	(0.13)	2.13	(1.09)	**2.02**	(0.44)	2.54	(1.86)	**2.07**	(0.42)	1.39	(0.90)
Partners	Peru	**1.42**	(0.18)	**1.15**	(0.07)	c	c	0.89	(0.14)	c	c	1.07	(0.21)	0.72	(0.64)
Partners	Russia	**1.41**	(0.21)	**0.78**	(0.08)	**2.03**	(0.42)	0.81	(0.22)	0.66	(0.31)	**2.16**	(0.36)	1.07	(0.42)

Note: Values that are statistically significant are indicated in bold (see Annex A3).
StatLink http://dx.doi.org/10.1787/888933486266

[Part 1/1]

Table A1.2d Likelihood of a valid response about spending and saving behaviour

		Increased likelihood of giving a valid response to the question on spending behaviour													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.24	(0.26)	1.08	(0.13)	0.73	(0.20)	0.54	(0.17)	**0.31**	(0.12)	**2.76**	(0.69)	**5.50**	(2.30)
OECD	Canadian provinces	0.60	(0.20)	1.46	(0.30)	1.11	(0.47)	0.64	(0.38)	1.31	(1.38)	**3.15**	(1.42)	**28.92**	(34.38)
OECD	Chile	1.21	(0.21)	0.92	(0.08)	2.65	(1.42)	**0.61**	(0.15)	1.24	(1.34)	**2.93**	(0.61)	1.80	(0.78)
OECD	Italy	1.15	(0.26)	1.02	(0.13)	0.99	(0.37)	**0.43**	(0.15)	**0.22**	(0.11)	**2.70**	(0.74)	**11.19**	(6.14)
OECD	Netherlands	**0.26**	(0.16)	0.61	(0.26)	**6.43**	(5.67)	2.30	(3.43)	c	c	**22.96**	(23.73)	4.51	(6.78)
OECD	Poland	1.11	(0.34)	0.84	(0.20)	c	c	0.92	(0.55)	0.55	(0.57)	**3.81**	(1.87)	**18.67**	(12.57)
OECD	Slovak Republic	1.47	(0.30)	**0.60**	(0.09)	c	c	0.66	(0.20)	0.52	(0.37)	**2.26**	(0.50)	4.10	(4.58)
OECD	Spain	0.78	(0.17)	0.95	(0.11)	0.85	(0.38)	0.85	(0.25)	1.08	(0.77)	**2.84**	(0.54)	**9.17**	(4.13)
OECD	United States	**2.06**	(0.53)	**1.30**	(0.14)	**2.51**	(0.72)	0.70	(0.29)	0.56	(0.59)	**3.06**	(1.47)	**3.63**	(2.16)
OECD	OECD average-10	1.10	(0.10)	0.98	(0.06)	**2.18**	(0.85)	0.85	(0.39)	0.72	(0.28)	**5.16**	(2.66)	**9.72**	(4.26)
Partners	Brazil	1.04	(0.10)	**1.19**	(0.06)	c	c	**0.71**	(0.09)	0.52	(0.32)	1.12	(0.11)	1.36	(1.04)
Partners	B-S-J-G (China)	1.03	(0.34)	0.96	(0.17)	c	c	0.61	(0.31)	0.50	(0.37)	**6.47**	(4.12)	**8.93**	(6.59)
Partners	Lithuania	**0.48**	(0.17)	0.85	(0.23)	**3.97**	(2.15)	2.02	(0.84)	0.90	(0.78)	**3.18**	(1.00)	3.96	(3.09)
Partners	Peru	**1.46**	(0.21)	**1.25**	(0.09)	c	c	0.73	(0.12)	c	c	0.81	(0.18)	3.66	(4.71)
Partners	Russia	1.38	(0.26)	**0.69**	(0.08)	**2.30**	(0.50)	0.58	(0.20)	0.47	(0.24)	**1.90**	(0.39)	1.96	(0.85)
		Increased likelihood of giving a valid response to the question on saving behaviour													
		Boy		PISA index of economic, social and cultural status (ESCS)		Non-immigrant		Performing at Levels 2, 3 or 4 in mathematics		Performing at Levels 5 or 6 in mathematics		Gave a valid response to the last financial literacy cognitive item		Intercept	
		Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD	Belgium (Flemish)	1.14	(0.21)	1.04	(0.12)	0.78	(0.19)	0.56	(0.17)	**0.30**	(0.11)	**3.63**	(0.87)	**3.62**	(1.26)
OECD	Canadian provinces	**0.48**	(0.14)	1.15	(0.25)	0.90	(0.40)	0.67	(0.39)	1.70	(2.22)	**4.29**	(1.76)	**24.96**	(20.94)
OECD	Chile	1.28	(0.24)	0.94	(0.07)	1.53	(1.14)	**0.61**	(0.15)	0.96	(0.92)	**2.54**	(0.50)	2.80	(1.52)
OECD	Italy	1.25	(0.25)	0.92	(0.12)	1.16	(0.42)	0.64	(0.21)	**0.36**	(0.17)	**2.12**	(0.55)	**6.10**	(2.31)
OECD	Netherlands	**0.33**	(0.18)	0.86	(0.47)	1.64	(1.35)	2.01	(2.48)	c	c	**49.48**	(43.38)	4.64	(5.10)
OECD	Poland	0.76	(0.22)	0.80	(0.16)	c	c	0.90	(0.56)	0.57	(0.58)	**4.00**	(1.69)	**16.95**	(9.90)
OECD	Slovak Republic	**1.60**	(0.31)	**0.63**	(0.09)	c	c	0.57	(0.18)	0.36	(0.19)	**2.00**	(0.42)	7.00	(7.26)
OECD	Spain	0.81	(0.18)	0.89	(0.09)	0.77	(0.28)	1.30	(0.35)	1.95	(1.46)	**2.59**	(0.51)	**5.72**	(2.55)
OECD	United States	**1.87**	(0.46)	**1.26**	(0.14)	**1.85**	(0.52)	0.87	(0.32)	0.76	(0.73)	**5.24**	(2.04)	1.89	(0.88)
OECD	OECD average-10	1.06	(0.09)	0.94	(0.07)	1.23	(0.28)	0.90	(0.29)	0.87	(0.37)	**8.43**	(4.83)	**8.19**	(2.79)
Partners	Brazil	1.16	(0.10)	**1.21**	(0.06)	c	c	**0.70**	(0.10)	0.45	(0.30)	1.11	(0.12)	1.11	(0.82)
Partners	B-S-J-G (China)	1.18	(0.37)	1.24	(0.22)	c	c	0.71	(0.34)	0.72	(0.55)	**4.84**	(2.87)	**264.71**	(609.78)
Partners	Lithuania	**0.51**	(0.16)	0.94	(0.22)	**3.21**	(1.63)	1.75	(0.69)	0.91	(0.80)	**4.40**	(1.54)	3.52	(2.71)
Partners	Peru	**1.46**	(0.19)	**1.18**	(0.08)	c	c	0.78	(0.14)	c	c	0.89	(0.19)	3.13	(3.96)
Partners	Russia	1.37	(0.23)	**0.73**	(0.09)	**2.41**	(0.49)	0.60	(0.19)	0.47	(0.23)	**2.18**	(0.56)	1.45	(0.71)

Note: Values that are statistically significant are indicated in bold (see Annex A3).
StatLink http://dx.doi.org/10.1787/888933486272

References

Ganzeboom, H.B.G. (2010), "A new international socio-economic index [ISEI] of occupational status for the International Standard Classification of Occupation 2008 [ISCO-08] constructed with data from the ISSP 2002-2007; with an analysis of quality of occupational measurement in ISSP." Paper presented at Annual Conference of International Social Survey Programme, Lisbon, May 1, 2010.

Ganzeboom, H.B.G. and **D.J. Treiman** (2003), "Three Internationally Standardised Measures for Comparative Research on Occupational Status", pp. 159-193 in J.H.P. Hoffmeyer-Zlotnik and C. Wolf (Eds.), *Advances in Cross-National Comparison: A European Working Book for Demographic and Socio-Economic Variables*, Kluwer Academic Press, New York.

OECD (forthcoming), *PISA 2015 Technical Report,* PISA, OECD Publishing, Paris.

OECD (2016), *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic and Financial Literacy,* PISA, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264255425-en.

OECD (2007), *PISA 2006: Science Competencies for Tomorrow's World*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264040014-en.

OECD (1999), *Classifying Educational Programmes: Manual for ISCED-97 Implementation in OECD Countries,* OECD Publishing, Paris.

Warm, T.A. (1985), "Weighted Maximum Likelihood Estimation of Ability in Item Response Theory with Tests of Finite Length", Technical Report CGI-TR-85-08, U.S. Coast Guard Institute, Oklahoma City.

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

Definition of the PISA target population

PISA 2015 provides an assessment of the cumulative outcomes 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.

Differences between countries in the nature and extent of pre-primary education and care, the age at entry into formal schooling and the institutional structure of education systems do not allow for a definition of internationally comparable grade levels. Consequently, international comparisons of performance in education 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 level 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 18 days (0.20 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 school. In PISA, these knowledge and skills are referred to as the outcomes 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 later on as/if students' educational experiences converge over time.

If a country's scores in science, reading or mathematics 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 in school, home and beyond, have resulted in higher outcomes in the literacy domains that PISA measures.

The PISA target population does 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 requested grade-based results for the purpose of national analyses, PISA 2015 provided a sampling option to supplement age-based sampling with grade-based sampling.

Population coverage

All countries and economies attempted to maximise the coverage of 15-year-olds enrolled in education in their national samples, including students enrolled in special-education institutions. As a result, PISA 2015 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 12 countries – the United Kingdom (8.22%), Luxembourg (8.16%), Canada (7.49%), Norway (6.75%), New Zealand (6.54%), Sweden (5.71%), Estonia (5.52%), Australia (5.31%),

Montenegro (5.17%), Lithuania (5.12%), Latvia (5.07%), and Denmark (5.04%) – achieved this standard, and in 29 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), Denmark, Latvia, New Zealand and Sweden 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: schools that were geographically inaccessible or where the administration of the PISA assessment was not considered feasible; and 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 the former group and 2% maximum for the latter group). The magnitude, nature and justification of school-level exclusions are documented in the *PISA 2015 Technical Report* (OECD, forthcoming).
- At the student level: students with an intellectual disability; students with a functional disability; students with limited assessment language proficiency; other (a category defined by the national centres and approved by the international centre); and 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 disciplinary 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 2015. Further information on the target population and the implementation of PISA sampling standards can be found in the *PISA 2015 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 means the year 2014 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: Belgium excluded 0.21% of its population for a particular type of student educated while working; Canada excluded 1.22% of its population from Territories and Aboriginal reserves; Chile excluded 0.04% of its students who live in Easter Island, Juan Fernandez Archipelago and Antarctica; and the United Arab Emirates excluded 0.04% of its students who had no information available. The adjudicated region of Massachusetts in the United States excluded 13.11% of its students, and North Carolina excluded 5.64% of its students. For these two regions, the desired target populations cover 15-year-old students in grade 7 or above in public schools only. The students excluded from the desired population are private school students.
- **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 2015. 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: 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); 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); students with limited proficiency in the assessment language (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 assessment may be excluded); other (a category defined by the national centres and approved by the international centre); and students taught in a language of instruction for the main domain for which no materials were available.

[Part 1/1]

Table A2.1 PISA target populations and samples

		Population and sample information												Coverage indices		
		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	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
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
OECD	Australia	282 888	282 547	282 547	6 940	275 607	2.46	14 530	256 329	681	7 736	2.93	5.31	0.947	0.947	0.906
	Austria	88 013	82 683	82 683	790	81 893	0.96	7 007	73 379	84	866	1.17	2.11	0.979	0.979	0.834
	Belgium	123 630	121 954	121 694	1 597	120 097	1.31	9 651	114 902	39	410	0.36	1.66	0.983	0.981	0.929
	Canada	396 966	381 660	376 994	1 590	375 404	0.42	20 058	331 546	1 830	25 340	7.10	7.49	0.925	0.914	0.835
	Chile	255 440	245 947	245 852	2 641	243 211	1.07	7 053	203 782	37	1 393	0.68	1.75	0.983	0.982	0.798
	Czech Republic	90 391	90 076	90 076	1 814	88 262	2.01	6 894	84 519	25	368	0.43	2.44	0.976	0.976	0.935
	Denmark	68 174	67 466	67 466	605	66 861	0.90	7 161	60 655	514	2 644	4.18	5.04	0.950	0.950	0.890
	Estonia	11 676	11 491	11 491	416	11 075	3.62	5 587	10 834	116	218	1.97	5.52	0.945	0.945	0.928
	Finland	58 526	58 955	58 955	472	58 483	0.80	5 882	56 934	124	1 157	1.99	2.78	0.972	0.972	0.973
	France	807 867	778 679	778 679	28 742	749 937	3.69	6 108	734 944	35	3 620	0.49	4.16	0.958	0.958	0.910
	Germany	774 149	774 149	774 149	11 150	762 999	1.44	6 522	743 969	54	5 342	0.71	2.14	0.979	0.979	0.961
	Greece	105 530	105 253	105 253	953	104 300	0.91	5 532	96 157	58	965	0.99	1.89	0.981	0.981	0.911
	Hungary	94 515	90 065	90 065	1 945	88 120	2.16	5 658	84 644	55	1 009	1.18	3.31	0.967	0.967	0.896
	Iceland	4 250	4 195	4 195	17	4 178	0.41	3 374	3 966	131	132	3.23	3.62	0.964	0.964	0.933
	Ireland	61 234	59 811	59 811	72	59 739	0.12	5 741	59 082	197	1 825	3.00	3.11	0.969	0.969	0.965
	Israel	124 852	118 997	118 997	2 310	116 687	1.94	6 598	117 031	115	1 803	1.52	3.43	0.966	0.966	0.937
	Italy	616 761	567 268	567 268	11 190	556 078	1.97	11 583	495 093	246	9 395	1.86	3.80	0.962	0.962	0.803
	Japan	1 201 615	1 175 907	1 175 907	27 323	1 148 584	2.32	6 647	1 138 349	2	318	0.03	2.35	0.976	0.976	0.947
	Korea	620 687	619 950	619 950	3 555	616 395	0.57	5 581	569 106	20	1 806	0.32	0.89	0.991	0.991	0.917
	Latvia	17 255	16 955	16 955	677	16 278	3.99	4 869	15 320	70	174	1.12	5.07	0.949	0.949	0.888
	Luxembourg	6 327	6 053	6 053	162	5 891	2.68	5 299	5 540	331	331	5.64	8.16	0.918	0.918	0.876
	Mexico	2 257 399	1 401 247	1 401 247	5 905	1 395 342	0.42	7 568	1 392 995	30	6 810	0.49	0.91	0.991	0.991	0.617
	Netherlands	201 670	200 976	200 976	6 866	194 110	3.42	5 385	191 817	14	502	0.26	3.67	0.963	0.963	0.951
	New Zealand	60 162	57 448	57 448	681	56 767	1.19	4 520	54 274	333	3 112	5.42	6.54	0.935	0.935	0.902
	Norway	63 642	63 491	63 491	854	62 637	1.35	5 456	58 083	345	3 366	5.48	6.75	0.933	0.933	0.913
	Poland	380 366	361 600	361 600	6 122	355 478	1.69	4 478	345 709	34	2 418	0.69	2.38	0.976	0.976	0.909
	Portugal	110 939	101 107	101 107	424	100 683	0.42	7 325	97 214	105	860	0.88	1.29	0.987	0.987	0.876
	Slovak Republic	55 674	55 203	55 203	1 376	53 827	2.49	6 350	49 654	114	912	1.80	4.25	0.957	0.957	0.892
	Slovenia	18 078	17 689	17 689	290	17 399	1.64	6 406	16 773	114	247	1.45	3.07	0.969	0.969	0.928
	Spain	440 084	414 276	414 276	2 175	412 101	0.53	6 736	399 935	200	10 893	2.65	3.16	0.968	0.968	0.909
	Sweden	97 749	97 210	97 210	1 214	95 996	1.25	5 458	91 491	275	4 324	4.51	5.71	0.943	0.943	0.936
	Switzerland	85 495	83 655	83 655	2 320	81 335	2.77	5 860	82 223	107	1 357	1.62	4.35	0.956	0.956	0.962
	Turkey	1 324 089	1 100 074	1 100 074	5 746	1 094 328	0.52	5 895	925 366	31	5 359	0.58	1.10	0.989	0.989	0.699
	United Kingdom	747 593	746 328	746 328	23 412	722 916	3.14	14 157	627 703	870	34 747	5.25	8.22	0.918	0.918	0.840
	United States	4 220 325	3 992 053	3 992 053	12 001	3 980 052	0.30	5 712	3 524 497	193	109 580	3.02	3.31	0.967	0.967	0.835
Partners	Albania	48 610	45 163	45 163	10	45 153	0.02	5 215	40 896	0	0	0.00	0.02	1.000	1.000	0.841
	Algeria	389 315	354 936	354 936	0	354 936	0.00	5 519	306 647	0	0	0.00	0.00	1.000	1.000	0.788
	Argentina	718 635	578 308	578 308	2 617	575 691	0.45	6 349	394 917	21	1 367	0.34	0.80	0.992	0.992	0.550
	Brazil	3 430 255	2 853 388	2 853 388	64 392	2 788 996	2.26	23 141	2 425 961	119	13 543	0.56	2.80	0.972	0.972	0.707
	B-S-J-G (China)	2 084 958	1 507 518	1 507 518	58 639	1 448 879	3.89	9 841	1 331 794	33	3 609	0.27	4.15	0.959	0.959	0.639
	Bulgaria	66 601	59 397	59 397	1 124	58 273	1.89	5 928	53 685	49	433	0.80	2.68	0.973	0.973	0.806
	Colombia	760 919	674 079	674 079	37	674 042	0.01	11 795	567 848	9	507	0.09	0.09	0.999	0.999	0.746
	Costa Rica	81 773	66 524	66 524	0	66 524	0.00	6 866	51 897	13	98	0.19	0.19	0.998	0.998	0.635
	Croatia	45 031	35 920	35 920	805	35 115	2.24	5 809	40 899	86	589	1.42	3.63	0.964	0.964	0.908
	Cyprus*	9 255	9 255	9 253	109	9 144	1.18	5 571	8 785	228	292	3.22	4.36	0.956	0.956	0.949
	Dominican Republic	193 153	139 555	139 555	2 382	137 173	1.71	4 740	132 300	4	106	0.08	1.79	0.982	0.982	0.685
	FYROM	16 719	16 717	16 717	259	16 458	1.55	5 324	15 847	8	19	0.12	1.67	0.983	0.983	0.948
	Georgia	48 695	43 197	43 197	1 675	41 522	3.88	5 316	38 334	35	230	0.60	4.45	0.955	0.955	0.787
	Hong Kong (China)	65 100	61 630	61 630	708	60 922	1.15	5 359	57 662	36	374	0.65	1.79	0.982	0.982	0.886
	Indonesia	4 534 216	3 182 816	3 182 816	4 046	3 178 770	0.13	6 513	3 092 773	0	0	0.00	0.13	0.999	0.999	0.682
	Jordan	126 399	121 729	121 729	71	121 658	0.06	7 267	108 669	70	1 006	0.92	0.97	0.990	0.990	0.860
	Kazakhstan	211 407	209 555	209 555	7 475	202 080	3.57	7 841	192 909	0	0	0.00	3.57	0.964	0.964	0.912
	Kosovo	31 546	28 229	28 229	1 156	27 073	4.10	4 826	22 333	50	174	0.77	4.84	0.952	0.952	0.708
	Lebanon	64 044	62 281	62 281	1 300	60 981	2.09	4 546	42 331	0	0	0.00	2.09	0.979	0.979	0.661
	Lithuania	33 163	32 097	32 097	573	31 524	1.79	6 525	29 915	227	1 050	3.39	5.12	0.949	0.949	0.902
	Macao (China)	5 100	4 417	4 417	3	4 414	0.07	4 476	4 507	0	0	0.00	0.07	0.999	0.999	0.884
	Malaysia	540 000	448 838	448 838	2 418	446 420	0.54	8 861	412 524	41	2 344	0.56	1.10	0.989	0.989	0.764
	Malta	4 397	4 406	4 406	63	4 343	1.43	3 634	4 296	41	41	0.95	2.36	0.976	0.976	0.977
	Moldova	31 576	30 601	30 601	182	30 419	0.59	5 325	29 341	21	118	0.40	0.99	0.990	0.990	0.929
	Montenegro	7 524	7 506	7 506	40	7 466	0.53	5 665	6 777	300	332	4.66	5.17	0.948	0.948	0.901
	Peru	580 371	478 229	478 229	6 355	471 874	1.33	6 971	431 738	13	745	0.17	1.50	0.985	0.985	0.744
	Qatar	13 871	13 850	13 850	380	13 470	2.74	12 083	12 951	193	193	1.47	4.17	0.958	0.958	0.934
	Romania	176 334	176 334	176 334	1 823	174 511	1.03	4 876	164 216	3	120	0.07	1.11	0.989	0.989	0.931
	Russia	1 176 473	1 172 943	1 172 943	24 217	1 148 726	2.06	6 036	1 120 932	13	2 469	0.22	2.28	0.977	0.977	0.953
	Singapore	48 218	47 050	47 050	445	46 605	0.95	6 115	46 224	25	179	0.39	1.33	0.987	0.987	0.959
	Chinese Taipei	295 056	287 783	287 783	1 179	286 604	0.41	7 708	251 424	22	647	0.26	0.67	0.993	0.993	0.852
	Thailand	895 513	756 917	756 917	9 646	747 271	1.27	8 249	634 795	22	2 107	0.33	1.60	0.984	0.984	0.709
	Trinidad and Tobago	17 371	17 371	17 371	0	17 371	0.00	4 692	13 197	0	0	0.00	0.00	1.000	1.000	0.760
	Tunisia	122 186	122 186	122 186	679	121 507	0.56	5 375	113 599	3	61	0.05	0.61	0.994	0.994	0.930
	United Arab Emirates	51 687	51 518	51 499	994	50 505	1.93	14 167	46 950	63	152	0.32	2.25	0.978	0.977	0.908
	Uruguay	53 533	43 865	43 865	4	43 861	0.01	6 062	38 287	6	32	0.08	0.09	0.999	0.999	0.715
	Viet Nam	1 803 552	1 032 599	1 032 599	6 557	1 026 042	0.63	5 826	874 859	0	0	0.00	0.63	0.994	0.994	0.485

Notes: For a full explanation of the details in this table please refer to the *PISA 2015 Technical Report* (OECD, forthcoming).
The figure for total national population of 15-year-olds enrolled in Column 2 may occasionally be larger than the total number of 15-year-olds in Column 1 due to differing data sources.
For Mexico, in 2015, the Total population of 15-year-olds enrolled in grade 7 or above is an estimate of the target population size of the sample frame from which the 15-year-olds students were selected for the PISA test. At the time Mexico provided the information to PISA, the official figure for this population was 1 573 952.
* See note at the beginning of this Annex.
StatLink http://dx.doi.org/10.1787/888933433129

[Part 1/2]

Table A2.2 Exclusions

		Student exclusions (unweighted)					
		Number of excluded students with functional disability (Code 1)	Number of excluded students with intellectual 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
		(1)	(2)	(3)	(4)	(5)	(6)
OECD	Australia	85	528	68	0	0	681
	Austria	8	15	61	0	0	84
	Belgium	4	18	17	0	0	39
	Canada	156	1 308	366	0	0	1 830
	Chile	6	30	1	0	0	37
	Czech Republic	2	9	14	0	0	25
	Denmark	18	269	156	70	1	514
	Estonia	17	93	6	0	0	116
	Finland	2	90	17	8	7	124
	France	5	21	9	0	0	35
	Germany	4	25	25	0	0	54
	Greece	3	44	11	0	0	58
	Hungary	3	13	9	30	0	55
	Iceland	9	66	47	9	0	131
	Ireland	25	57	55	60	0	197
	Israel	22	68	25	0	0	115
	Italy	78	147	21	0	0	246
	Japan	0	2	0	0	0	2
	Korea	3	17	0	0	0	20
	Latvia	7	47	16	0	0	70
	Luxembourg	4	254	73	0	0	331
	Mexico	4	23	3	0	0	30
	Netherlands	1	13	0	0	0	14
	New Zealand	23	140	167	0	3	333
	Norway	11	253	81	0	0	345
	Poland	11	20	0	3	0	34
	Portugal	4	99	2	0	0	105
	Slovak Republic	7	71	2	34	0	114
	Slovenia	33	36	45	0	0	114
	Spain	9	144	47	0	0	200
	Sweden	154	0	121	0	0	275
	Switzerland	8	42	57	0	0	107
	Turkey	1	23	7	0	0	31
	United Kingdom	77	690	102	0	1	870
	United States	16	120	44	13	0	193
Partners	Albania	0	0	0	0	0	0
	Algeria	0	0	0	0	0	0
	Argentina	10	10	1	0	0	21
	Brazil	20	99	0	0	0	119
	B-S-J-G (China)	6	25	2	0	0	33
	Bulgaria	39	6	4	0	0	49
	Colombia	3	4	2	0	0	9
	Costa Rica	3	1	0	9	0	13
	Croatia	2	75	9	0	0	86
	Cyprus*	12	164	52	0	0	228
	Dominican Republic	1	3	0	0	0	4
	FYROM	7	1	0	0	0	8
	Georgia	3	25	7	0	0	35
	Hong Kong (China)	0	35	1	0	0	36
	Indonesia	0	0	0	0	0	0
	Jordan	43	17	10	0	0	70
	Kazakhstan	0	0	0	0	0	0
	Kosovo	9	13	27	0	0	50
	Lebanon	0	0	0	0	0	0
	Lithuania	12	213	2	0	0	227
	Macao (China)	0	0	0	0	0	0
	Malaysia	10	22	9	0	0	41
	Malta	8	27	6	0	0	41
	Moldova	12	8	1	0	0	21
	Montenegro	14	23	5	0	258	300
	Peru	4	9	0	0	0	13
	Qatar	76	110	7	0	0	193
	Romania	1	1	1	0	0	3
	Russia	3	10	0	0	0	13
	Singapore	3	15	7	0	0	25
	Chinese Taipei	3	19	0	0	0	22
	Thailand	1	19	2	0	0	22
	Trinidad and Tobago	0	0	0	0	0	0
	Tunisia	0	0	3	0	0	3
	United Arab Emirates	16	24	23	0	0	63
	Uruguay	2	4	0	0	0	6
	Viet Nam	0	0	0	0	0	0

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 reasons 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 the details in this table please refer to the *PISA 2015 Technical Report* (OECD, forthcoming).

* See note at the beginning of this Annex.

StatLink http://dx.doi.org/10.1787/888933433129

[Part 2/2]

Table A2.2 Exclusions

		Student exclusion (weighted)					
		Weighted number of excluded students with functional disability (Code 1)	Weighted number of excluded students with intellectual disability (Code 2)	Weighted number of excluded students because of language (Code 3)	Weighted number of excluded students for other reasons (Code 4)	Weighted number of excluded students because of no materials available in the language of instruction (Code 5)	Total weighted number of excluded students
		(7)	(8)	(9)	(10)	(11)	(12)
OECD	Australia	932	6 011	793	0	0	7 736
	Austria	74	117	675	0	0	866
	Belgium	33	192	185	0	0	410
	Canada	1 901	18 018	5 421	0	0	25 340
	Chile	194	1 190	9	0	0	1 393
	Czech Republic	40	140	188	0	0	368
	Denmark	122	1 539	551	421	11	2 644
	Estonia	29	176	13	0	0	218
	Finland	18	858	156	67	58	1 157
	France	562	2 144	914	0	0	3 620
	Germany	423	2 562	2 357	0	0	5 342
	Greece	43	729	193	0	0	965
	Hungary	57	284	114	554	0	1 009
	Iceland	9	67	47	9	0	132
	Ireland	213	526	516	570	0	1 825
	Israel	349	1 070	384	0	0	1 803
	Italy	3 316	5 199	880	0	0	9 395
	Japan	0	318	0	0	0	318
	Korea	291	1 515	0	0	0	1 806
	Latvia	21	115	38	0	0	174
	Luxembourg	4	254	73	0	0	331
	Mexico	842	4 802	1 165	0	0	6 810
	Netherlands	33	469	0	0	0	502
	New Zealand	233	1 287	1 568	0	24	3 112
	Norway	105	2 471	790	0	0	3 366
	Poland	876	1 339	0	203	0	2 418
	Portugal	29	818	13	0	0	860
	Slovak Republic	44	567	12	288	0	912
	Slovenia	84	71	92	0	0	247
	Spain	511	7 662	2 720	0	0	10 893
	Sweden	2 380	0	1 944	0	0	4 324
	Switzerland	91	540	726	0	0	1 357
	Turkey	43	4 094	1 222	0	0	5 359
	United Kingdom	2 724	27 808	4 001	0	214	34 747
	United States	7 873	67 816	26 525	7 366	0	109 580
Partners	Albania	0	0	0	0	0	0
	Algeria	0	0	0	0	0	0
	Argentina	579	770	18	0	0	1 367
	Brazil	1 743	11 800	0	0	0	13 543
	B-S-J-G (China)	438	2 970	201	0	0	3 609
	Bulgaria	347	51	35	0	0	433
	Colombia	181	309	17	0	0	507
	Costa Rica	22	5	0	71	0	98
	Croatia	13	501	75	0	0	589
	Cyprus*	16	212	65	0	0	292
	Dominican Republic	24	82	0	0	0	106
	FYROM	15	4	0	0	0	19
	Georgia	19	170	41	0	0	230
	Hong Kong (China)	0	363	11	0	0	374
	Indonesia	0	0	0	0	0	0
	Jordan	656	227	122	0	0	1 006
	Kazakhstan	0	0	0	0	0	0
	Kosovo	28	37	104	0	0	174
	Lebanon	0	0	0	0	0	0
	Lithuania	40	1 000	10	0	0	1 050
	Macao (China)	0	0	0	0	0	0
	Malaysia	663	1 100	580	0	0	2 344
	Malta	8	27	6	0	0	41
	Moldova	66	51	1	0	0	118
	Montenegro	27	38	6	0	261	332
	Peru	224	520	0	0	0	745
	Qatar	76	110	7	0	0	193
	Romania	31	63	26	0	0	120
	Russia	425	2 044	0	0	0	2 469
	Singapore	22	115	43	0	0	179
	Chinese Taipei	78	568	0	0	0	647
	Thailand	114	1 830	163	0	0	2 107
	Trinidad and Tobago	0	0	0	0	0	0
	Tunisia	0	0	61	0	0	61
	United Arab Emirates	30	75	47	0	0	152
	Uruguay	10	22	0	0	0	32
	Viet Nam	0	0	0	0	0	0

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 reasons 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 the details in this table please refer to the *PISA 2015 Technical Report* (OECD, forthcoming).
* See note at the beginning of this Annex.
StatLink http://dx.doi.org/10.1787/888933433129

- **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.
- **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.
- **Column 13** presents an index of the extent to which the national desired target population is covered by the PISA sample. Australia, Canada, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Montenegro, New Zealand, Norway, Sweden and the United Kingdom 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 2015. 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 on 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 used that assumes a bivariate normal distribution for performance and the propensity to participate. For details, see the *PISA 2015 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 2015 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. At least 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 2015.

In the case of Iceland, Luxembourg, Macao (China), Malta 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, 42 students were then selected with equal probability (all 15-year-old students were selected if fewer than 42 were enrolled). The number of students to be sampled per school could deviate from 42, 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.

PISA 2015 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 of 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, subunits 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 and Croatia, 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. In Luxembourg, a school on the border with Germany was split according to the country in which the students resided. In addition, the International schools in Luxembourg were split into the students who were instructed in any of the three official languages, and those in the part of the schools that was excluded because no materials were available in the languages of instruction. The United Arab Emirates had schools split by curricula, and sometimes by gender, with other schools remaining whole. Because of reorganisation, some of Sweden's schools were split into parts, with each part having one principal. In Portugal, schools were reorganised into clusters, with teachers and the principal shared by all units in the school cluster.

[Part 1/1]

Table A2.3 Response rates

		Initial sample – before school replacement					Final sample – after school replacement					Final sample – students within schools 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)	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)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
OECD	Australia	94	260 657	276 072	720	788	95	262 130	276 072	723	788	84	204 763	243 789	14 089	17 477
	Austria	100	81 690	81 730	269	273	100	81 690	81 730	269	273	87	63 660	73 521	7 007	9 868
	Belgium	83	98 786	118 915	244	301	95	113 435	118 936	286	301	91	99 760	110 075	9 635	10 602
	Canada	74	283 853	381 133	703	1 008	79	299 512	381 189	726	1 008	81	210 476	260 487	19 604	24 129
	Chile	92	215 139	232 756	207	232	99	230 749	232 757	226	232	93	189 206	202 774	7 039	7 515
	Czech Republic	98	86 354	87 999	339	344	98	86 354	87 999	339	344	89	73 386	82 672	6 835	7 693
	Denmark	90	57 803	63 897	327	371	92	58 837	63 931	331	371	89	49 732	55 830	7 149	8 184
	Estonia	100	11 142	11 154	206	207	100	11 142	11 154	206	207	93	10 088	10 822	5 587	5 994
	Finland	100	58 653	58 782	167	168	100	58 800	58 800	168	168	93	53 198	56 934	5 882	6 294
	France	91	679 984	749 284	232	255	94	706 838	749 284	241	255	88	611 563	693 336	5 980	6 783
	Germany	96	764 423	794 206	245	256	99	785 813	794 206	253	256	93	685 972	735 487	6 476	6 944
	Greece	92	95 030	103 031	190	212	98	101 653	103 218	209	212	94	89 588	94 986	5 511	5 838
	Hungary	93	83 897	89 808	231	251	99	88 751	89 825	244	251	92	77 212	83 657	5 643	6 101
	Iceland	99	4 114	4 163	122	129	99	4 114	4 163	122	129	86	3 365	3 908	3 365	3 908
	Ireland	99	61 023	61 461	167	169	99	61 023	61 461	167	169	89	51 947	58 630	5 741	6 478
	Israel	91	105 192	115 717	169	190	93	107 570	115 717	173	190	90	98 572	108 940	6 598	7 294
	Italy	74	383 933	516 113	414	532	88	451 098	515 515	464	532	88	377 011	430 041	11 477	12 841
	Japan	94	1 087 414	1 151 305	189	200	99	1 139 734	1 151 305	198	200	97	1 096 193	1 127 265	6 647	6 838
	Korea	100	612 937	615 107	168	169	100	612 937	615 107	168	169	99	559 121	567 284	5 581	5 664
	Latvia	86	14 122	16 334	231	269	93	15 103	16 324	248	269	90	12 799	14 155	4 845	5 368
	Luxembourg	100	5 891	5 891	44	44	100	5 891	5 891	44	44	96	5 299	5 540	5 299	5 540
	Mexico	95	1 311 608	1 373 919	269	284	98	1 339 901	1 373 919	275	284	95	1 290 435	1 352 237	7 568	7 938
	Netherlands	63	121 527	191 966	125	201	93	178 929	191 966	184	201	85	152 346	178 985	5 345	6 269
	New Zealand	71	40 623	56 875	145	210	85	48 094	56 913	176	210	80	36 860	45 897	4 453	5 547
	Norway	95	58 824	61 809	229	241	95	58 824	61 809	229	241	91	50 163	55 277	5 456	6 016
	Poland	88	314 288	355 158	151	170	99	352 754	355 158	168	170	88	300 617	343 405	4 466	5 108
	Portugal	86	87 756	102 193	213	254	95	97 516	102 537	238	254	82	75 391	91 916	7 180	8 732
	Slovak Republic	93	50 513	54 499	272	295	99	53 908	54 562	288	295	92	45 357	49 103	6 342	6 900
	Slovenia	98	16 886	17 286	332	349	98	16 896	17 286	333	349	92	15 072	16 424	6 406	7 009
	Spain	99	404 640	409 246	199	201	100	409 246	409 246	201	201	89	356 509	399 935	6 736	7 540
	Sweden	100	93 819	94 097	202	205	100	93 819	94 097	202	205	91	82 582	91 081	5 458	6 013
	Switzerland	93	75 482	81 026	212	232	98	79 481	81 375	225	232	92	74 465	80 544	5 838	6 305
	Turkey	97	1 057 318	1 091 317	175	195	99	1 081 935	1 091 528	187	195	95	874 609	918 816	5 895	6 211
	United Kingdom	84	591 757	707 415	506	598	93	654 992	707 415	547	598	89	517 426	581 252	14 120	16 123
	United States	67	2 601 386	3 902 089	142	213	83	3 244 399	3 893 828	177	213	90	2 629 707	2 929 771	5 712	6 376
Partners	Albania	100	43 809	43 919	229	230	100	43 809	43 919	229	230	94	38 174	40 814	5 213	5 555
	Algeria	96	341 463	355 216	159	166	96	341 463	355 216	159	166	92	274 121	296 434	5 494	5 934
	Argentina	89	508 448	572 941	212	238	97	556 478	572 941	231	238	90	345 508	382 352	6 311	7 016
	Brazil	93	2 509 198	2 692 686	806	889	94	2 533 711	2 693 137	815	889	87	1 996 574	2 286 505	22 791	26 586
	B-S-J-G (China)	88	1 259 845	1 437 201	248	268	100	1 437 652	1 437 652	268	268	97	1 287 710	1 331 794	9 841	10 097
	Bulgaria	100	56 265	56 483	179	180	100	56 600	56 600	180	180	95	50 931	53 685	5 928	6 240
	Colombia	99	664 664	673 817	364	375	100	672 526	673 835	371	375	95	535 682	566 734	11 777	12 611
	Costa Rica	99	66 485	67 073	204	206	99	66 485	67 073	204	206	92	47 494	51 369	6 846	7 411
	Croatia	100	34 575	34 652	160	162	100	34 575	34 652	160	162	91	37 275	40 803	5 809	6 354
	Cyprus*	97	8 830	9 126	122	132	97	8 830	9 126	122	132	94	8 016	8 526	5 561	5 957
	Dominican Republic	99	136 669	138 187	193	195	99	136 669	138 187	193	195	94	122 620	130 700	4 731	5 026
	FYROM	100	16 426	16 472	106	107	100	16 426	16 472	106	107	95	14 999	15 802	5 324	5 617
	Georgia	97	40 552	41 595	256	267	99	41 081	41 566	262	267	94	35 567	37 873	5 316	5 689
	Hong Kong (China)	75	45 603	60 716	115	153	90	54 795	60 715	138	153	93	48 222	51 806	5 359	5 747
	Indonesia	98	3 126 468	3 176 076	232	236	100	3 176 076	3 176 076	236	236	98	3 015 844	3 092 773	6 513	6 694
	Jordan	100	119 024	119 024	250	250	100	119 024	119 024	250	250	97	105 868	108 669	7 267	7 462
	Kazakhstan	100	202 701	202 701	232	232	100	202 701	202 701	232	232	97	187 683	192 921	7 841	8 059
	Kosovo	100	26 924	26 924	224	224	100	26 924	26 924	224	224	99	22 016	22 333	4 826	4 896
	Lebanon	67	40 542	60 882	208	308	87	53 091	60 797	270	308	95	36 052	38 143	4 546	4 788
	Lithuania	99	31 386	31 588	309	311	100	31 543	31 588	310	311	91	27 070	29 889	6 523	7 202
	Macao (China)	100	4 414	4 414	45	45	100	4 414	4 414	45	45	99	4 476	4 507	4 476	4 507
	Malaysia	51	229 340	446 237	147	230	98	437 424	446 100	224	230	97	393 785	407 396	8 843	9 097
	Malta	100	4 341	4 343	59	61	100	4 341	4 343	59	61	85	3 634	4 294	3 634	4 294
	Moldova	100	30 145	30 145	229	229	100	30 145	30 145	229	229	98	28 754	29 341	5 325	5 436
	Montenegro	100	7 301	7 312	64	65	100	7 301	7 312	64	65	94	6 346	6 766	5 665	6 043
	Peru	100	468 406	470 651	280	282	100	469 662	470 651	281	282	99	426 205	430 959	6 971	7 054
	Qatar	99	13 333	13 470	166	168	99	13 333	13 470	166	168	94	12 061	12 819	12 061	12 819
	Romania	99	171 553	172 652	181	182	100	172 495	172 495	182	182	99	162 918	164 216	4 876	4 910
	Russia	99	1 181 937	1 189 441	209	210	99	1 181 937	1 189 441	209	210	97	1 072 914	1 108 068	6 021	6 215
	Singapore	97	45 299	46 620	175	179	98	45 553	46 620	176	179	93	42 241	45 259	6 105	6 555
	Chinese Taipei	100	286 778	286 778	214	214	100	286 778	286 778	214	214	98	246 408	251 424	7 708	7 871
	Thailand	99	739 772	751 010	269	273	100	751 010	751 010	273	273	97	614 996	634 795	8 249	8 491
	Trinidad and Tobago	92	15 904	17 371	141	163	92	15 904	17 371	141	163	79	9 674	12 188	4 587	5 745
	Tunisia	99	121 751	122 767	162	165	99	121 838	122 792	163	165	86	97 337	112 665	5 340	6 175
	United Arab Emirates	99	49 310	50 060	473	477	99	49 310	50 060	473	477	95	43 774	46 263	14 167	15 014
	Uruguay	98	42 986	43 737	217	221	99	43 442	43 737	219	221	86	32 762	38 023	6 059	7 026
	Viet Nam	100	996 757	996 757	188	188	100	996 757	996 757	188	188	100	871 353	874 859	5 826	5 849

* See note at the beginning of this Annex.

StatLink http://dx.doi.org/10.1787/888933433129

Grade levels

Students assessed in PISA 2015 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

		All students											
		7th grade		8th grade		9th grade		10th grade		11th grade		12th grade and above	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	0.0	(0.0)	0.1	(0.0)	11.2	(0.3)	74.6	(0.4)	14.0	(0.4)	0.1	(0.0)
	Austria	0.0	(0.0)	2.0	(0.6)	20.8	(0.9)	71.2	(1.0)	5.9	(0.3)	0.0	(0.0)
	Belgium	0.6	(0.1)	6.4	(0.5)	30.7	(0.7)	61.0	(0.9)	1.3	(0.1)	0.0	(0.0)
	Canada	0.1	(0.0)	0.7	(0.1)	10.8	(0.5)	87.6	(0.6)	0.8	(0.1)	0.0	(0.0)
	Chile	1.7	(0.3)	4.1	(0.6)	24.0	(0.7)	68.1	(1.0)	2.1	(0.2)	0.0	(0.0)
	Czech Republic	0.5	(0.1)	3.9	(0.3)	49.4	(1.2)	46.2	(1.2)	0.0	(0.0)	0.0	c
	Denmark	0.2	(0.1)	16.4	(0.6)	81.9	(0.7)	1.4	(0.5)	0.0	c	0.0	c
	Estonia	0.8	(0.2)	21.3	(0.6)	76.6	(0.6)	1.3	(0.3)	0.0	c	0.0	(0.0)
	Finland	0.5	(0.1)	13.6	(0.4)	85.7	(0.4)	0.0	(0.0)	0.2	(0.1)	0.0	c
	France	0.0	(0.0)	1.0	(0.2)	23.1	(0.6)	72.5	(0.7)	3.2	(0.2)	0.1	(0.1)
	Germany	0.5	(0.1)	7.7	(0.4)	47.3	(0.8)	43.1	(0.8)	1.5	(0.5)	0.0	(0.0)
	Greece	0.2	(0.1)	0.7	(0.2)	3.8	(0.8)	95.3	(0.9)	0.0	c	0.0	c
	Hungary	1.7	(0.3)	8.5	(0.5)	75.8	(0.7)	14.0	(0.5)	0.0	c	0.0	c
	Iceland	0.0	c	0.0	c	0.0	c	100.0	c	0.0	c	0.0	c
	Ireland	0.0	(0.0)	1.8	(0.2)	60.6	(0.7)	26.5	(1.1)	11.1	(0.9)	0.0	c
	Israel	0.0	c	0.1	(0.0)	16.4	(0.9)	82.7	(0.9)	0.9	(0.3)	0.0	c
	Italy	0.1	(0.0)	1.0	(0.2)	15.2	(0.6)	77.2	(0.7)	6.6	(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	9.1	(0.8)	90.4	(0.8)	0.5	(0.1)	0.0	c
	Latvia	0.9	(0.2)	11.7	(0.5)	84.4	(0.6)	2.9	(0.3)	0.0	(0.0)	0.0	c
	Luxembourg	0.3	(0.1)	7.9	(0.1)	50.9	(0.1)	40.3	(0.1)	0.6	(0.0)	0.0	c
	Mexico	2.3	(0.3)	4.8	(0.4)	31.9	(1.4)	60.3	(1.6)	0.5	(0.1)	0.2	(0.0)
	Netherlands	0.1	(0.0)	2.8	(0.3)	41.6	(0.6)	54.8	(0.6)	0.8	(0.2)	0.0	(0.0)
	New Zealand	0.0	c	0.0	c	0.0	(0.0)	6.2	(0.3)	88.8	(0.5)	5.0	(0.5)
	Norway	0.0	c	0.0	c	0.6	(0.1)	99.3	(0.2)	0.1	(0.1)	0.0	c
	Poland	0.6	(0.1)	4.9	(0.3)	93.8	(0.4)	0.6	(0.2)	0.0	c	0.0	c
	Portugal	3.2	(0.3)	8.4	(0.5)	22.9	(0.9)	65.1	(1.2)	0.4	(0.1)	0.0	c
	Slovak Republic	2.2	(0.4)	4.6	(0.4)	42.6	(1.3)	50.6	(1.2)	0.1	(0.0)	0.0	c
	Slovenia	0.0	c	0.3	(0.1)	4.8	(0.3)	94.6	(0.4)	0.3	(0.1)	0.0	c
	Spain	0.1	(0.0)	8.6	(0.5)	23.4	(0.6)	67.9	(0.9)	0.1	(0.1)	0.0	c
	Sweden	0.1	(0.1)	3.1	(0.4)	94.9	(0.8)	1.8	(0.7)	0.1	(0.1)	0.0	c
	Switzerland	0.5	(0.1)	11.8	(0.7)	61.3	(1.2)	25.9	(1.3)	0.5	(0.1)	0.0	(0.0)
	Turkey	0.6	(0.1)	2.6	(0.4)	20.7	(1.0)	72.9	(1.2)	3.0	(0.3)	0.1	(0.0)
	United Kingdom	0.0	c	0.0	c	0.0	c	1.6	(0.3)	97.4	(0.4)	1.0	(0.3)
	United States	0.0	(0.0)	0.5	(0.3)	9.6	(0.7)	72.4	(0.9)	17.3	(0.6)	0.1	(0.0)
Partners	Albania	0.2	(0.1)	1.0	(0.2)	35.8	(2.3)	61.7	(2.3)	1.2	(0.7)	0.0	(0.0)
	Algeria	18.8	(1.0)	23.5	(1.1)	35.1	(1.5)	19.4	(2.1)	3.2	(0.7)	0.0	c
	Brazil	3.5	(0.2)	6.4	(0.4)	12.5	(0.5)	35.9	(0.9)	39.2	(0.8)	2.5	(0.2)
	B-S-J-G (China)	1.1	(0.2)	9.2	(0.7)	52.7	(1.7)	34.6	(2.0)	2.2	(0.5)	0.1	(0.0)
	Bulgaria	0.5	(0.2)	3.0	(0.6)	92.2	(0.8)	4.3	(0.4)	0.0	c	0.0	c
	Colombia	5.3	(0.4)	12.3	(0.6)	22.7	(0.6)	40.2	(0.7)	19.5	(0.6)	0.0	c
	Costa Rica	6.2	(0.7)	14.0	(0.7)	33.0	(1.2)	46.5	(1.6)	0.2	(0.1)	0.1	(0.1)
	Croatia	0.0	c	0.2	(0.2)	79.2	(0.5)	20.6	(0.4)	0.0	c	0.0	c
	Cyprus*	0.0	c	0.3	(0.0)	5.8	(0.1)	93.1	(0.1)	0.7	(0.1)	0.0	c
	Dominican Republic	7.1	(0.8)	13.8	(1.2)	20.6	(0.8)	41.9	(1.1)	14.2	(0.7)	2.4	(0.3)
	FYROM	0.1	(0.1)	0.1	(0.1)	70.2	(0.2)	29.7	(0.2)	0.0	c	0.0	c
	Georgia	0.1	(0.0)	0.8	(0.2)	22.0	(0.8)	76.0	(0.9)	1.1	(0.3)	0.0	c
	Hong Kong (China)	1.1	(0.1)	5.6	(0.4)	26.0	(0.7)	66.7	(0.7)	0.6	(0.5)	0.0	c
	Indonesia	2.1	(0.3)	8.1	(0.7)	42.1	(1.5)	45.5	(1.6)	2.3	(0.4)	0.0	(0.0)
	Jordan	0.2	(0.1)	0.6	(0.1)	6.6	(0.4)	92.6	(0.4)	0.0	c	0.0	c
	Kosovo	0.0	(0.1)	0.6	(0.1)	24.9	(0.8)	72.4	(0.9)	2.1	(0.2)	0.0	c
	Lebanon	3.7	(0.5)	8.3	(0.8)	16.6	(1.1)	62.3	(1.4)	9.0	(0.8)	0.1	(0.1)
	Lithuania	0.1	(0.0)	2.6	(0.2)	86.3	(0.4)	11.0	(0.4)	0.0	(0.0)	0.0	c
	Macao (China)	2.9	(0.1)	12.2	(0.2)	29.7	(0.2)	54.5	(0.1)	0.6	(0.1)	0.0	c
	Malta	0.0	c	0.0	c	0.3	(0.1)	6.1	(0.2)	93.6	(0.1)	0.1	(0.0)
	Moldova	0.2	(0.1)	7.6	(0.5)	84.5	(0.8)	7.5	(0.8)	0.0	(0.0)	0.0	c
	Montenegro	0.0	c	0.0	c	83.7	(0.1)	16.3	(0.1)	0.0	c	0.0	c
	Peru	2.5	(0.3)	6.6	(0.4)	15.9	(0.5)	50.2	(0.8)	24.8	(0.8)	0.0	c
	Qatar	0.9	(0.1)	3.5	(0.1)	16.3	(0.1)	60.7	(0.1)	18.0	(0.1)	0.6	(0.0)
	Romania	1.4	(0.3)	8.9	(0.5)	74.8	(0.9)	14.9	(0.7)	0.0	c	0.0	c
	Russia	0.2	(0.1)	6.6	(0.3)	79.7	(1.5)	13.4	(1.5)	0.1	(0.0)	0.0	c
	Singapore	0.0	(0.0)	1.9	(0.3)	7.9	(0.8)	90.0	(1.0)	0.1	(0.0)	0.1	(0.0)
	Chinese Taipei	0.0	c	0.0	c	35.4	(0.7)	64.6	(0.7)	0.0	c	0.0	c
	Thailand	0.2	(0.1)	0.6	(0.2)	23.8	(1.0)	72.9	(1.0)	2.4	(0.4)	0.0	c
	Trinidad and Tobago	3.3	(0.2)	10.8	(0.3)	27.3	(0.3)	56.5	(0.3)	2.2	(0.2)	0.0	c
	Tunisia	4.3	(0.3)	10.6	(0.8)	19.6	(1.3)	60.9	(1.7)	4.6	(0.4)	0.0	c
	United Arab Emirates	0.6	(0.1)	2.5	(0.3)	10.6	(0.7)	53.4	(0.8)	31.4	(0.8)	1.5	(0.1)
	Uruguay	7.5	(0.6)	9.7	(0.5)	20.7	(0.7)	61.3	(1.2)	0.8	(0.1)	0.0	c
	Viet Nam	0.3	(0.1)	1.7	(0.4)	7.7	(1.8)	90.4	(2.2)	0.0	(0.0)	0.0	c
	Argentina**	1.6	(0.4)	9.7	(0.8)	27.4	(1.2)	58.5	(1.6)	2.8	(0.3)	0.0	c
	Kazakhstan**	0.1	(0.1)	2.7	(0.3)	60.4	(1.7)	36.2	(1.8)	0.6	(0.1)	0.0	c
	Malaysia**	0.0	c	0.0	c	3.2	(0.6)	96.4	(0.7)	0.4	(0.3)	0.0	c

* See note at the beginning of this Annex.
** Coverage is too small to ensure comparability (see Annex A4).
StatLink http://dx.doi.org/10.1787/888933433129

[Part 1/1]

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

		Boys												Girls											
		7th grade		8th grade		9th grade		10th grade		11th grade		12th grade and above		7th grade		8th grade		9th grade		10th grade		11th grade		12th grade and above	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD	Australia	0.0	(0.0)	0.2	(0.1)	13.2	(0.4)	73.5	(0.5)	13.1	(0.5)	0.0	(0.0)	0.0	(0.0)	0.1	(0.0)	9.2	(0.3)	75.7	(0.5)	14.9	(0.6)	0.1	(0.1)
	Austria	0.1	(0.1)	2.0	(0.4)	21.6	(1.2)	71.1	(1.2)	5.2	(0.4)	0.0	(0.0)	0.0	c	2.0	(0.9)	20.0	(1.0)	71.4	(1.3)	6.6	(0.4)	0.0	(0.0)
	Belgium	0.7	(0.1)	6.7	(0.5)	33.6	(1.0)	57.9	(1.1)	1.2	(0.2)	0.0	c	0.6	(0.1)	6.2	(0.5)	27.7	(0.8)	64.2	(1.1)	1.3	(0.1)	0.0	(0.0)
	Canada	0.1	(0.1)	1.0	(0.2)	11.7	(0.6)	86.5	(0.6)	0.7	(0.1)	0.0	(0.0)	0.1	(0.0)	0.4	(0.1)	9.9	(0.6)	88.8	(0.6)	0.8	(0.1)	0.0	(0.0)
	Chile	2.2	(0.5)	4.8	(0.8)	26.4	(0.9)	64.8	(1.3)	1.8	(0.2)	0.1	(0.1)	1.2	(0.4)	3.5	(0.7)	21.5	(0.8)	71.4	(1.1)	2.4	(0.3)	0.0	c
	Czech Republic	0.6	(0.2)	5.5	(0.5)	52.3	(1.5)	41.5	(1.6)	0.0	(0.0)	0.0	c	0.4	(0.2)	2.2	(0.3)	46.2	(1.5)	51.2	(1.6)	0.0	c	0.0	c
	Denmark	0.3	(0.1)	21.9	(0.9)	76.6	(1.0)	1.2	(0.5)	0.0	c	0.0	c	0.1	(0.1)	10.8	(0.5)	87.3	(0.7)	1.7	(0.6)	0.0	c	0.0	c
	Estonia	1.3	(0.3)	23.7	(0.9)	74.2	(0.8)	0.8	(0.3)	0.0	c	0.0	(0.0)	0.2	(0.1)	18.8	(0.8)	79.1	(0.8)	1.9	(0.4)	0.0	c	0.0	c
	Finland	0.4	(0.1)	15.5	(0.6)	83.9	(0.6)	0.0	(0.0)	0.2	(0.1)	0.0	c	0.5	(0.1)	11.5	(0.5)	87.7	(0.5)	0.0	c	0.3	(0.2)	0.0	c
	France	0.0	c	1.0	(0.2)	26.1	(0.9)	69.6	(1.0)	3.1	(0.3)	0.2	(0.1)	0.1	(0.1)	1.0	(0.2)	20.1	(0.6)	75.4	(0.8)	3.3	(0.3)	0.1	(0.0)
	Germany	0.7	(0.2)	9.0	(0.5)	50.1	(1.0)	38.8	(1.0)	1.4	(0.4)	0.0	(0.0)	0.3	(0.1)	6.3	(0.6)	44.3	(0.9)	47.5	(1.0)	1.6	(0.6)	0.0	c
	Greece	0.4	(0.2)	1.1	(0.3)	4.7	(1.0)	93.8	(1.2)	0.0	c	0.0	c	0.1	(0.1)	0.2	(0.1)	2.8	(0.8)	96.9	(0.8)	0.0	c	0.0	c
	Hungary	1.8	(0.4)	10.1	(0.6)	75.6	(0.9)	12.5	(0.6)	0.0	c	0.0	c	1.6	(0.4)	6.9	(0.8)	76.0	(0.9)	15.5	(0.7)	0.0	c	0.0	c
	Iceland	0.0	c	0.0	c	0.0	c	100.0	c	0.0	c	0.0	c	0.0	c	0.0	c	0.0	c	100.0	c	0.0	c	0.0	c
	Ireland	0.0	c	2.2	(0.3)	62.8	(0.9)	24.1	(1.2)	10.9	(1.0)	0.0	c	0.0	(0.0)	1.4	(0.2)	58.2	(0.9)	29.0	(1.4)	11.3	(1.1)	0.0	c
	Israel	0.0	c	0.1	(0.1)	18.0	(1.2)	80.9	(1.3)	1.1	(0.6)	0.0	c	0.0	c	0.1	(0.0)	14.9	(0.8)	84.4	(0.8)	0.7	(0.1)	0.0	c
	Italy	0.2	(0.1)	1.3	(0.3)	18.1	(0.8)	75.0	(0.9)	5.4	(0.4)	0.0	c	0.1	(0.0)	0.7	(0.2)	12.2	(0.8)	79.3	(1.0)	7.7	(0.5)	0.0	c
	Japan	0.0	c	0.0	c	0.0	c	100.0	c	0.0	c	0.0	c	0.0	c	0.0	c	0.0	c	100.0	c	0.0	c	0.0	c
	Korea	0.0	c	0.0	c	10.1	(1.4)	89.4	(1.4)	0.5	(0.1)	0.0	c	0.0	c	0.0	c	8.0	(0.8)	91.5	(0.8)	0.5	(0.1)	0.0	c
	Latvia	1.5	(0.4)	14.7	(0.8)	81.8	(0.9)	1.9	(0.3)	0.0	(0.0)	0.0	c	0.4	(0.2)	8.7	(0.7)	87.0	(0.7)	3.9	(0.4)	0.0	c	0.0	c
	Luxembourg	0.2	(0.1)	9.4	(0.2)	52.4	(0.3)	37.3	(0.2)	0.7	(0.1)	0.0	c	0.3	(0.1)	6.4	(0.2)	49.4	(0.2)	43.3	(0.2)	0.6	(0.1)	0.0	c
	Mexico	3.1	(0.5)	5.9	(0.6)	32.2	(1.5)	58.0	(1.6)	0.6	(0.2)	0.2	(0.0)	1.5	(0.3)	3.7	(0.4)	31.6	(1.7)	62.5	(1.7)	0.4	(0.1)	0.2	(0.1)
	Netherlands	0.0	(0.0)	3.8	(0.4)	45.3	(0.8)	50.2	(0.8)	0.8	(0.3)	0.0	c	0.1	(0.0)	1.9	(0.3)	38.0	(0.7)	59.3	(0.7)	0.7	(0.2)	0.0	(0.0)
	New Zealand	0.0	c	0.0	c	0.0	c	6.9	(0.5)	88.6	(0.8)	4.5	(0.5)	0.0	c	0.0	c	0.0	(0.0)	5.4	(0.4)	89.1	(0.6)	5.5	(0.6)
	Norway	0.0	c	0.0	c	0.8	(0.2)	99.1	(0.2)	0.1	(0.1)	0.0	c	0.0	c	0.0	c	0.3	(0.1)	99.6	(0.1)	0.1	(0.1)	0.0	c
	Poland	0.9	(0.2)	6.8	(0.5)	92.1	(0.6)	0.2	(0.2)	0.0	c	0.0	c	0.4	(0.1)	3.0	(0.3)	95.6	(0.5)	1.1	(0.3)	0.0	c	0.0	c
	Portugal	4.2	(0.4)	10.5	(0.7)	25.4	(1.0)	59.6	(1.4)	0.3	(0.1)	0.0	c	2.1	(0.4)	6.4	(0.5)	20.5	(0.9)	70.5	(1.2)	0.5	(0.1)	0.0	c
	Slovak Republic	2.4	(0.4)	4.8	(0.5)	43.5	(1.6)	49.4	(1.8)	0.0	c	0.0	c	1.9	(0.5)	4.3	(0.6)	41.7	(1.8)	51.9	(1.8)	0.1	(0.1)	0.0	c
	Slovenia	0.0	c	0.5	(0.2)	5.4	(0.7)	93.9	(0.7)	0.2	(0.1)	0.0	c	0.0	c	0.2	(0.1)	4.1	(0.6)	95.3	(0.6)	0.4	(0.2)	0.0	c
	Spain	0.1	(0.1)	10.7	(0.7)	25.4	(0.8)	63.7	(1.1)	0.1	(0.1)	0.0	c	0.0	c	6.5	(0.5)	21.3	(0.8)	72.1	(1.0)	0.1	(0.1)	0.0	c
	Sweden	0.1	(0.1)	3.5	(0.5)	95.0	(0.9)	1.4	(0.7)	0.1	(0.1)	0.0	c	0.2	(0.1)	2.6	(0.4)	94.9	(1.0)	2.3	(0.9)	0.1	(0.1)	0.0	c
	Switzerland	0.7	(0.2)	13.4	(0.8)	60.7	(1.1)	24.7	(1.2)	0.5	(0.1)	0.0	c	0.3	(0.1)	10.1	(0.8)	62.0	(1.7)	27.2	(1.9)	0.5	(0.2)	0.0	(0.0)
	Turkey	0.8	(0.3)	3.1	(0.6)	25.4	(1.2)	68.4	(1.6)	2.2	(0.4)	0.1	(0.1)	0.4	(0.2)	2.1	(0.4)	16.1	(1.1)	77.5	(1.3)	3.8	(0.4)	0.1	(0.0)
	United Kingdom	0.0	c	0.0	c	0.0	c	1.9	(0.5)	97.3	(0.6)	0.9	(0.3)	0.0	c	0.0	c	0.0	c	1.4	(0.2)	97.5	(0.3)	1.1	(0.3)
	United States	0.0	c	0.5	(0.4)	11.6	(0.8)	72.4	(1.0)	15.3	(0.7)	0.2	(0.1)	0.1	(0.1)	0.5	(0.2)	7.6	(0.6)	72.4	(0.9)	19.4	(0.7)	0.1	(0.0)
Partners	Albania	0.2	(0.2)	0.9	(0.2)	41.2	(2.7)	56.3	(2.6)	1.3	(0.9)	0.0	(0.0)	0.1	(0.1)	1.1	(0.3)	30.4	(2.1)	67.1	(2.2)	1.2	(0.5)	0.1	(0.0)
	Algeria	24.4	(1.3)	25.7	(1.2)	32.6	(1.5)	14.7	(1.9)	2.6	(0.7)	0.0	c	12.6	(1.1)	21.0	(1.2)	37.9	(2.0)	24.6	(2.5)	3.9	(0.8)	0.0	c
	Brazil	4.6	(0.3)	7.8	(0.6)	13.9	(0.6)	36.5	(1.0)	35.3	(0.9)	1.8	(0.2)	2.4	(0.2)	5.0	(0.4)	11.1	(0.6)	35.3	(0.9)	43.0	(0.9)	3.1	(0.2)
	B-S-J-G (China)	1.2	(0.2)	9.9	(0.7)	55.4	(1.7)	31.6	(1.9)	1.9	(0.5)	0.1	(0.0)	1.1	(0.2)	8.4	(0.8)	49.6	(1.8)	38.1	(2.2)	2.6	(0.5)	0.1	(0.1)
	Bulgaria	0.6	(0.2)	4.1	(0.8)	91.8	(1.0)	3.5	(0.4)	0.0	c	0.0	c	0.4	(0.2)	1.8	(0.4)	92.7	(0.7)	5.2	(0.4)	0.0	c	0.0	c
	Colombia	7.2	(0.6)	14.3	(0.8)	25.2	(0.8)	37.1	(0.9)	16.2	(0.8)	0.0	c	3.6	(0.4)	10.5	(0.7)	20.5	(0.9)	42.9	(1.0)	22.5	(0.8)	0.0	c
	Costa Rica	7.8	(0.8)	16.7	(0.8)	34.3	(1.2)	41.2	(1.5)	0.1	(0.0)	0.0	c	4.7	(0.7)	11.4	(0.7)	31.8	(1.4)	51.6	(1.8)	0.3	(0.1)	0.2	(0.1)
	Croatia	0.0	c	0.2	(0.1)	80.5	(0.5)	19.4	(0.5)	0.0	c	0.0	c	0.0	c	0.3	(0.2)	78.0	(0.7)	21.7	(0.7)	0.0	c	0.0	c
	Cyprus*	0.0	c	0.3	(0.1)	6.6	(0.2)	92.4	(0.2)	0.6	(0.1)	0.0	c	0.0	c	0.3	(0.1)	5.1	(0.2)	93.8	(0.2)	0.8	(0.1)	0.0	c
	Dominican Republic	10.3	(1.1)	16.4	(1.5)	23.3	(1.2)	37.2	(1.4)	11.1	(0.8)	1.7	(0.3)	4.0	(0.6)	11.2	(1.1)	18.1	(0.8)	46.5	(1.1)	17.2	(0.8)	3.0	(0.3)
	FYROM	0.2	(0.2)	0.2	(0.2)	70.9	(0.3)	28.8	(0.2)	0.0	c	0.0	c	0.0	c	0.0	c	69.4	(0.3)	30.6	(0.3)	0.0	c	0.0	c
	Georgia	0.1	(0.0)	0.9	(0.2)	23.0	(1.0)	75.2	(1.0)	0.8	(0.2)	0.0	c	0.1	(0.1)	0.7	(0.2)	20.9	(0.9)	76.8	(1.0)	1.5	(0.4)	0.0	c
	Hong Kong (China)	1.3	(0.2)	6.4	(0.5)	28.5	(0.8)	63.3	(0.9)	0.5	(0.4)	0.0	c	1.0	(0.2)	4.7	(0.4)	23.5	(0.8)	70.2	(0.9)	0.6	(0.6)	0.0	c
	Indonesia	2.5	(0.4)	8.9	(0.9)	44.3	(1.9)	42.1	(2.0)	2.1	(0.4)	0.0	(0.0)	1.7	(0.3)	7.2	(1.0)	39.8	(1.9)	48.9	(2.1)	2.4	(0.4)	0.0	c
	Jordan	0.1	(0.1)	0.5	(0.1)	6.6	(0.7)	92.9	(0.7)	0.0	c	0.0	c	0.2	(0.1)	0.7	(0.1)	6.6	(0.6)	92.4	(0.6)	0.0	c	0.0	c
	Kosovo	0.1	(0.1)	0.5	(0.1)	26.4	(0.9)	71.5	(1.0)	1.6	(0.3)	0.0	c	0.0	c	0.7	(0.2)	23.5	(1.0)	73.3	(1.0)	2.5	(0.3)	0.0	c
	Lebanon	4.0	(0.6)	8.2	(0.9)	17.2	(1.4)	63.5	(1.7)	6.9	(0.7)	0.2	(0.1)	3.4	(0.6)	8.3	(1.0)	16.1	(1.2)	61.2	(1.8)	10.8	(1.2)	0.1	(0.1)
	Lithuania	0.2	(0.1)	3.5	(0.3)	87.4	(0.6)	8.8	(0.5)	0.0	(0.0)	0.0	c	0.0	(0.0)	1.7	(0.2)	85.1	(0.7)	13.1	(0.6)	0.0	(0.0)	0.0	c
	Macao (China)	4.3	(0.2)	16.4	(0.3)	30.8	(0.2)	48.2	(0.2)	0.4	(0.1)	0.0	c	1.6	(0.2)	8.0	(0.2)	28.7	(0.3)	60.8	(0.3)	0.9	(0.2)	0.0	c
	Malta	0.0	c	0.0	c	0.5	(0.1)	6.8	(0.3)	92.7	(0.2)	0.0	c	0.0	c	0.0	c	0.1	(0.0)	5.4	(0.2)	94.4	(0.2)	0.1	(0.1)
	Moldova	0.3	(0.1)	8.2	(0.7)	86.3	(0.9)	5.0	(0.9)	0.1	(0.1)	0.0	c	0.2	(0.1)	7.0	(0.6)	82.8	(1.2)	10.1	(1.2)	0.0	c	0.0	c
	Montenegro	0.0	c	0.0	c	85.2	(0.2)	14.8	(0.2)	0.0	c	0.0	c	0.0	c	0.0	c	82.2	(0.2)	17.8	(0.2)	0.0	c	0.0	c
	Peru	3.0	(0.5)	7.5	(0.5)	17.9	(0.7)	48.7	(0.9)	22.9	(1.0)	0.0	c	1.9	(0.3)	5.6	(0.5)	14.0	(0.6)	51.7	(1.0)	26.8	(0.9)	0.0	c
	Qatar	0.8	(0.1)	3.6	(0.1)	18.0	(0.2)	59.3	(0.2)	17.6	(0.2)	0.6	(0.1)	1.0	(0.1)	3.4	(0.1)	14.5	(0.1)	62.1	(0.2)	18.4	(0.2)	0.6	(0.1)
	Romania	1.7	(0.4)	10.7	(0.8)	74.3	(1.0)	13.3	(0.7)	0.0	c	0.0	c	1.1	(0.4)	7.2	(0.8)	75.3	(1.1)	16.4	(0.8)	0.0	c	0.0	c
	Russia	0.2	(0.1)	7.2	(0.5)	80.1	(1.7)	12.4	(1.7)	0.0	(0.0)	0.0	c	0.1	(0.1)	6.0	(0.4)	79.3	(1.5)	14.4	(1.6)	0.1	(0.1)	0.0	c
	Singapore	0.1	(0.0)	1.8	(0.3)	8.9	(0.9)	89.1	(1.1)	0.1	(0.1)	0.0	(0.0)	0.0	(0.0)	2.0	(0.4)	6.9	(0.8)	90.8	(1.1)	0.2	(0.1)	0.1	(0.0)
	Chinese Taipei	0.0	c	0.0	c	36.5	(1.3)	63.5	(1.3)	0.0	c	0.0	c	0.0	c	0.0	c	34.3	(1.3)	65.7	(1.3)	0.0	c	0.0	c
	Thailand	0.2	(0.1)	0.8	(0.3)	25.4	(1.2)	71.4	(1.2)	2.3	(0.4)	0.0	c	0.3	(0.1)	0.5	(0.2)	22.5	(1.3)	74.1	(1.3)	2.6	(0.4)	0.0	c
	Trinidad and Tobago	3.7	(0.3)	14.2	(0.5)	30.8	(0.5)	48.9	(0.5)	2.4	(0.2)	0.0	c	2.8	(0.2)	7.5	(0.4)	23.8	(0.4)	63.9	(0.5)	2.0	(0.3)	0.0	c
	Tunisia	5.9	(0.5)	13.8	(1.0)	22.0	(1.4)	54.0	(1.9)	4.3	(0.5)	0.0	c	3.0	(0.3)	7.8	(0.7)	17.5	(1.4)	67.0	(1.8)	4.8	(0.5)	0.0	c
	United Arab Emirates	0.7	(0.1)	2.9	(0.4)	11.4	(1.1)	54.0	(1.3)	29.6	(1.0)	1.4	(0.2)	0.4	(0.1)	2.2	(0.5)	9.9	(0.9)	52.8	(0.9)	33.1	(1.1)	1.6	(0.2)
	Uruguay	9.2	(0.8)	11.2	(0.7)	22.5	(0.9)	56.5	(1.5)	0.5	(0.1)	0.0	c	6.0	(0.7)	8.3	(0.6)	19.0	(0.8)	65.6	(1.1)	1.1	(0.2)	0.0	c
	Viet Nam	0.5	(0.2)	2.3	(0.6)	11.1	(2.6)	86.1	(3.2)	0.0	c	0.0	c	0.1	(0.0)	1.1	(0.4)	4.6	(1.2)	94.2	(1.4)	0.0	(0.0)	0.0	c
	Argentina**	2.3	(0.6)	11.5	(0.9)	27.8	(1.3)	56.0	(1.8)	2.4	(0.3)	0.0	c	1.0	(0.3)	8.1	(0.9)	26.9	(1.4)	60.8	(1.7)	3.2	(0.3)	0.0	c
	Kazakhstan**	0.1	(0.1)	3.1	(0.4)	62.8	(2.3)	33.5	(2.4)	0.5	(0.1)	0.0	c	0.1	(0.1)	2.3	(0.3)	57.8	(1.7)	39.0	(1.8)	0.7	(0.1)	0.0	c
	Malaysia**	0.0	c	0.0	c	4.2	(0.8)	95.4	(0.9)	0.4	(0.3)	0.0	c	0.0	c	0.0	c	2.3	(0.5)	97.2	(0.6)	0.4	(0.4)	0.0	c

* See note at the beginning of this Annex.
** Coverage is too small to ensure comparability (see Annex A4).
StatLink http://dx.doi.org/10.1787/888933433129

Sample for the financial literacy option

Out of the 72 countries and economies that participated in PISA 2015, 15 also conducted the optional (computer-based) financial literacy assessment. Within these countries and economies, a subsample of the PISA sample was also tested in financial literacy, in addition to mathematics, reading and science. Students who were assessed using the following booklets were also assessed in financial literacy:

- Booklets C31, C33, C39 and C42 (science and reading),
- Booklets C43, C45, C51 and C54 (science and mathematics),
- Booklets C55-C66 (science, mathematics and reading).

Financial literacy was tested on computers as none of the countries or economies participating in the financial literacy option chose a paper-based assessment.

Table A2.5 reports data about the subsample of students assessed in financial literacy.

- **Column 1** shows the unweighted number of students in countries and economies participating in the financial literacy assessment.
- **Column 2** shows the weighted number of students in countries and economies participating in the financial literacy assessment, i.e. the number of students in the nationally defined target population that the PISA financial literacy sample represents.
- **Column 3** shows the unweighted number of students subsampled in the financial literacy assessment.
- **Column 4** shows the weighted number of students subsampled in the financial literacy assessment.

[Part 1/1]

Table A2.5 PISA financial literacy sample

		Financial literacy assessment			
		Number of participating students	Weighted number of participating students	Number of students subsampled for financial literacy	Weighted number of students subsampled for financial literacy
		(1)	(2)	(3)	(4)
OECD	Australia	14 530	256 329	14 530	256 329
	Belgium (Flemish)	5 675	62 986	1 433	15 783
	Canadian provinces	13 082	213 562	3 409	55 936
	Chile	7 053	203 782	1 809	51 991
	Italy	11 583	495 093	3 034	131 053
	Netherlands	5 385	191 817	1 365	48 874
	Poland	4 478	345 709	1 739	134 602
	Slovak Republic	6 350	49 654	1 629	12 611
	Spain	6 736	399 935	1 750	104 119
	United States	5 712	3 524 497	1 486	917 275
Partners	Brazil	23 141	2 425 961	6 078	637 918
	B-S-J-G (China)	9 841	1 331 794	2 555	344 508
	Lithuania	6 525	29 915	1 720	7 898
	Peru	6 971	431 738	1 804	111 917
	Russia	6 036	1 120 932	1 558	289 793

Note: For a full explanation of the details in this table please refer to the *PISA 2015 Technical Report* (OECD, forthcoming).
StatLink http://dx.doi.org/10.1787/888933486286

Population modelling for the results of the PISA 2015 financial literacy assessment

PISA uses plausible values drawn from a posteriori distribution by combining the IRT scaling of the test items with a latent regression model, using information from the student questionnaire in a population model. In the latent regression model, the distribution of the proficiency variable is assumed to depend not only on the responses to the cognitive item but also on a number of predictors, which are variables obtained from the background questionnaire. Because the latent regression of PISA is applied to multiple domains (mathematics, science, reading, collaborative problem solving and financial literacy), the population modelling is expanded to the multivariate distribution. This multivariate model comes with a substantial correlation (0.8-0.9) among the cognitive domains, further enhancing the accuracy of the plausible values beyond a univariate latent regression model. As a result, it is possible to calculate unbiased plausible values for all domains, even in the absence of responses to a set of items from a particular domain, as long as responses to other domains are present. See the *PISA 2015 Technical Report* (OECD, forthcoming) for more details.

About one-third of students from the countries and economies participating in the financial literacy assessment received financial literacy cognitive booklets – as indicated above – along with a specific "money management questionnaire"; the remaining two-thirds of students did not respond to either the cognitive financial literacy questions or the questionnaire about

money. For each country and economy, a population model was constructed based on the 33% of students who received the financial literacy instruments. This population model included all cognitive responses including other domains and responses to the background questionnaire. In order to calculate financial literacy plausible values for the other 67% of students, a separate, reduced population model was calculated. The reduced population model excluded the financial literacy cognitive items and responses to the money management questionnaire, since these students did not receive or respond to these items, and including them would have introduced bias in the estimate of the plausible values. Aggregating financial literacy plausible values from the 33% and from the 67% of students gives the best estimate of the distribution of financial literacy proficiency in each country/economy.

Basque region sample in the financial literacy option

The small sample size of the Basque regional data made it impossible to estimate a distinct population model for the Basque region that would account for regional specificities. Such specificities imply that by borrowing population parameters from the national sample, bias may be introduced in the distribution of performance of students who were not assigned to financial literacy instruments. Therefore, it was decided to remove from the database the 2 678 students who were not tested in financial literacy.

In the case of the Basque regional dataset, the 934 students who were assigned to financial literacy instruments should be taken to represent the entire defined target population for the region, which includes 17 424 students. Weights in the dataset have not been modified, as the estimation of most population statistics and their uncertainty depends only on the relative weight given to each observation. Weights may nevertheless need to be rescaled (multiplied by 17 424/4 432) for certain statistics that also depend on the absolute size of weights.

Tables available online

Table A2.1 Regions PISA target populations and samples, by adjudicated regions
(http://dx.doi.org/10.1787/888933433129)

Table A2.2 Regions Exclusions, by adjudicated regions
(http://dx.doi.org/10.1787/888933433129)

Table A2.3 Regions Response rates, by adjudicated regions
(http://dx.doi.org/10.1787/888933433129)

Table A2.4a Regions Percentage of students at each grade level, by adjudicated regions
(http://dx.doi.org/10.1787/888933433129)

Table A2.4b Regions Percentage of students at each grade level, by gender and adjudicated regions
(http://dx.doi.org/10.1787/888933433129)

Table A2.5 Regions PISA financial literacy sample, by adjudicated regions
(http://dx.doi.org/10.1787/888933486291)

References

OECD (forthcoming), *PISA 2015 Technical Report,* PISA, OECD Publishing, Paris.

ANNEX A3
TECHNICAL NOTES ON ANALYSES IN THIS VOLUME

Methods and definitions

Relative risk

The relative risk is a measure of the association between an antecedent factor and an outcome factor. The relative risk is simply the ratio of two risks, i.e. the risk of observing the outcome when the antecedent is present and the risk of observing the outcome when the antecedent is not present. Figure A3.1 presents the notation that is used in the following.

Figure A3.1 ■ **Labels used in a two-way table**

p_{11}	p_{12}	$p_{1.}$
p_{21}	p_{22}	$p_{2.}$
$p_{.1}$	$p_{.2}$	

p_{ij} represents the probabilities for each cell and is equal to the number of observations in a particular cell divided by the total number of observations. $p_{i.}$, $p_{.j}$ respectively represent the marginal probabilities for each row and for each column. The marginal probabilities are equal to the marginal frequencies divided by the total number of students.

Assuming that rows represent the antecedent factor, with the first row for "having the antecedent" and the second row for "not having the antecedent", and that the columns represent the outcome: the first column for "having the outcome" and the second column for "not having the outcome". The relative risk is then equal to:

$$RR = \frac{(p_{11}/p_{1.})}{(p_{21}/p_{2.})}$$

Odds ratio

The same notation can be used to define the odds ratio, another measure of the relative likelihood of a particular outcome across two groups. The odds ratio for observing the outcome when an antecedent is present is simply

$$OR = \frac{(p_{11}/p_{12})}{(p_{21}/p_{22})}$$

where p_{11}/p_{12} represents the "odds" of observing the outcome when the antecedent is present, and p_{21}/p_{22} represents the "odds" of observing the outcome when the antecedent is not present.

Logistic regression can be used to estimate the log ratio: the exponentiated logit coefficient for a binary variable is equivalent to the odds ratio. A "generalised" odds ratio, after accounting for other differences across groups, can be estimated by introducing control variables in the logistic regression.

Effect sizes

Sometimes it is useful to compare differences in an index between groups, such as boys and girls, across countries. A problem that may occur in such instances is that the distribution of the index varies across groups or countries. One way to resolve this is to calculate an effect size that accounts for differences in the distributions.

In accordance with common practices, effect sizes of less than 0.20 are considererd as small, effect sizes on the order of 0.50 as medium, and effect sizes greater than 0.80 as large.

A standardised difference is obtained by dividing the raw difference between two groups, such as boys and girls, by a measure of the variation in the underlying data. In this volume, the pooled standard deviation was used to standardise differences. The effect size between two subgroups is calculated as:

$$\frac{m_1 - m_2}{\sqrt{\sigma^2}}, \text{ i.e.}$$

m_1 and m_2, respectively, represent the mean values for the subgroups 1 and 2. σ^2 represents the overall (between and within-group) variance.

Standard errors and significance tests

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 girls in a country perform better than boys 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 an assoiciation 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 and differences between subgroup means

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

Similarly, differences between other groups of students (e.g. non-immigrant students and students with an immigrant background, or socio-economically advantaged and disadvantaged students) were tested for statistical significance. The definitions of the subgroups can, in general, be found in the tables and the text accompanying the analysis. All differences marked in bold in the tables presented in Annex B of this report are statistically significant at the 95% level.

Differences between subgroup means, after accounting for other variables

For many tables, subgroup comparisons were performed both on the observed difference ("before accounting for other variables") and after accounting for other variables, such as the PISA index of economic, social and cultural status of students. The adjusted differences were estimated using linear regression and tested for significance at the 95% confidence level. Significant differences are marked in bold.

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 on the index shown was calculated. Figures in bold indicate that the differences are statistically significantly different from zero at the 95% confidence level.

Relative risk and odds ratio

Figures in bold in the data tables presented in Annex B of this report indicate that the relative risk/odds ratio is statistically significantly different from 1 at the 95% confidence level. To compute statistical significance around the value of 1 (the null hypothesis), the relative-risk/odds-ratio statistic is assumed to follow a log-normal distribution, rather than a normal distribution, under the null hypothesis.

For many tables, "generalised" relative risks and odds ratios (after accounting for other variables) are also presented. These odds ratios were estimated using logistic regression and tested for significance against the null hypothesis of an odds ratio equal to 1 (i.e. equal likelihoods, after accounting for other variables). The relative risks were estimated using multinomial logistic regression and tested for significance against the null hypothesis of an odds ratio equal to 1 (i.e. equal likelihoods, after accounting for other variables).

Range of ranks

To calculate the range of ranks for countries, data are simulated using the mean and standard error of the mean for each relevant country to generate a distribution of possible values. Some 10 000 simulations are implemented and, based on these values, 10 000 possible rankings for each country are produced. For each country, the counts for each rank are aggregated from largest to smallest until they equal 9 500 or more. Then the range of ranks per country is reported, including all the ranks that have been aggregated. This means that there is at least 95% confidence about the range of ranks, and it is safe to assume unimodality in this distribution of ranks. This method has been used in all cycles of PISA since 2003, including PISA 2015.

The main difference between counting the number of countries whose performance is significantly higher (Figure IV.3.2) and the upper rank estimated in Figure IV.3.3 is that the former is based on pairwise comparisons of countries/economies, while the latter takes into account the multiple comparisons involved in computing a rank. Therefore, sometimes there is a slight difference between the range of ranks and counting the number of countries above a given country, based on pairwise comparisons of the selected countries' performance. For instance, the Netherlands and the Russian Federation have similar mean performance, based on Figure IV.3.3; but the rank for the Russian Federation can be restricted, with 95% confidence, to be between 4th and 5th, while the range of ranks for the Netherlands is slightly wider (between 4th and 6th) (Figure IV.3.3). Since the rank estimates for each country and economy provide a more nuanced interpretation of the rank positions than comparisons across countries, the results presented in Figure IV.3.3 should preferably be used when examining countries' and economies' rankings.

Standard errors in trend analyses of performance: link error

Standard errors for comparisons of performance across time account for the uncertainty in the equating procedure that allows scores in different PISA assessments to be expressed on the same scale. This additional source of uncertainty results in more conservative standard errors (larger than standard errors that were estimated before the introduction of this link error) (see Annex A5 for a technical discussion of the link error).

Figures in bold in the data tables for performance trends or changes presented in Annex B of this report indicate that the the change in performance for that particular group is statistically significantly different from 0 at the 95% confidence level. The standard errors used to calculate the statistical significance of the reported performance trend or change include the link error.

ANNEX A4
QUALITY ASSURANCE

Quality assurance procedures were implemented in all parts of PISA 2015, as was done for all previous PISA surveys. The PISA 2015 Technical Standards (www.oecd.org/pisa/) specify the way in which PISA must be implemented in each country, economy and adjudicated region. International contractors monitor the implementation in each of these and adjudicate on their adherence to the standards.

The consistent quality and linguistic equivalence of the PISA 2015 assessment instruments were facilitated by assessing the ease with which the original English version could be translated. Two source versions of the assessment instruments, in English and French were prepared (except for the financial literacy assessment and the operational manuals, which were provided only in English) in order for countries to conduct a double translation design, i.e. two independent translations from the source language(s), and reconciliation by a third person. Detailed instructions for the localisation (adaptation, translation and validation) of the instruments for the field trial and for their review for the main survey, and translation/adaptation guidelines were supplied. An independent team of expert verifiers, appointed and trained by the PISA Consortium, verified each national version against the English and/or French source versions. These translators' mother tongue was the language of instruction in the country concerned, and the translators were knowledgeable about education systems. For further information on PISA translation procedures, see the *PISA 2015 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 science, reading or mathematics instructor of any students in the sessions he or she would conduct 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 and economies were required to ensure that test administrators worked with the school co-ordinator to prepare the assessment session, including reviewing and updating the Student Tracking Form; completing the Session Attendance Form, which is designed to record students' attendance and instruments allocation; completing the Session Report Form, which is designed to summarise session times, any disturbance to the session, etc.; ensuring that the number of test booklets and questionnaires collected from students tallied with the number sent to the school (paper-based assessment countries) or ensuring that the number of USB sticks used for the assessment were accounted for (computer-based assessment countries); and sending the school questionnaire, student questionnaires, parent and teacher questionnaires (if applicable), and all test materials (both completed and not completed) to the national centre after the testing.

The PISA Consortium responsible for overseeing survey operations implemented all phases of the PISA Quality Monitor (PQM) process: interviewing and hiring PQM candidates in each of the countries, organising their training, selecting the schools to visit, and collecting information from the PQM visits. PISA Quality Monitors are independent contractors located in participating countries who are hired by the international survey operations contractor. They visit a sample of schools to observe test administration and to record the implementation of the documented field-operations procedures in the main survey.

Typically, two or three PQMs were hired for each country, and they visited an average of 15 schools in each country. If there were adjudicated regions in a country, it was usually necessary to hire additional PQMs, as a minimum of five schools were observed in adjudicated regions.

All quality-assurance data collected throughout the PISA 2015 assessment were entered and collated in a central data-adjudication database on the quality of field operations, printing, translation, school and student sampling, and coding. Comprehensive reports were then generated for the PISA Adjudication Group. This group was formed by the Technical Advisory Group and the Sampling Referee. Its role is to review the adjudication database and reports to recommend adequate treatment to preserve the quality of PISA data. For further information, see the *PISA 2015 Technical Report* (OECD, forthcoming).

References

OECD (forthcoming), *PISA 2015 Technical Report,* PISA, OECD Publishing, Paris.

ANNEX A5
CHANGES IN THE ADMINISTRATION AND SCALING OF PISA 2015 AND IMPLICATIONS FOR TRENDS ANALYSES

Comparing performance across PISA cycles

PISA assessments of science, reading, mathematics and financial literacy carried out in different years use the same performance scale, which means that score points on a scale are directly comparable over time. Comparisons of scores across time are possible because some items are common across assessments and because an equating procedure aligns performance scales that are derived from different calibrations of item parameters to each other.

All estimates of statistical quantities are associated with statistical uncertainty, and this is also true for the transformation parameters used to equate PISA scales over time. A link error that reflects this uncertainty is included in the estimate of the standard error for estimates of PISA performance trends and changes over time. (For more details concerning link errors, see the sections below.)

The uncertainty in equating scales is the product of changes in the way the test is administered (e.g. differences related to the test design) and scaled (e.g. differences related to the calibration samples) across the years. It also reflects the evolving nature of assessment frameworks. PISA revisits the framework for science, reading and mathematics every nine years, according to a rotating schedule, in order to capture the most recent understanding of what knowledge and skills are important for 15-year-olds to acquire in order to participate fully in tomorrow's societies.

Changes in test administration and design can influence somewhat how students respond to test items. Changes in samples and the models used for the scaling produce different estimates of item difficulty. As a consequence, there is some uncertainty when results from one cycle are reported on the scale based on a previous cycle. All cycles of PISA prior to 2015, for instance, differed from each other in various ways:

- *The assessment design.*[1] The assessment design can influence how students respond in several ways. For example, students might not perceive the same item as equally difficult when it is presented at the beginning of a test as when it is presented across different places in the test. Similarly, students may not invest the same effort when the item is part of a 30-minute "reading" sequence in the middle of a mathematics and science test, compared to when reading is the major domain. In PISA, these effects are unsystematic and are typically small, but they are part of the uncertainty in the estimates.
- *The calibration samples.* In PISA cycles prior to 2015, item difficulty was estimated using only the responses of students who participated in the most recent assessment. In PISA 2009 and PISA 2012, the calibration sample was a random subset of 500 students per country/economy. In PISA 2000, 2003 and 2006, the calibration sample included 500 students per country taken only from OECD countries (OECD, 2009). This implies that each trend item had as many (independent) estimates of item difficulty as there were cycles in which it was used. These estimates were not identical, and the variability among these estimated item difficulties contributes to the uncertainty of comparisons over PISA cycles. The use of only a subsample of the PISA student data per country further increases this uncertainty, and was justified by the limited computational power available at the time of early PISA cycles.
- *The set and the number of items common to previous assessments.* Just as the uncertainty around country mean performance and item parameters is reduced by including more schools and students in the sample, so the uncertainty around the link between scales is reduced by retaining more items included in previous assessments for the purpose building this link. For the major domain, the items that are common to prior assessments are a subset of the total number of items that make up the assessment because PISA progressively renews its pool of items in order to reflect the most recent frameworks. The frameworks are based on the current understanding of the reading, mathematics, science and financial literacy competencies that are required of 15-year-olds to be able to thrive in society.

PISA 2015 introduced several improvements in the test design and scaling procedure aimed at reducing the three sources of uncertainty highlighted above. In particular, the assessment design for PISA 2015 reduced or eliminated the difference in construct coverage across domains and students' perception of certain domains as "major" or "minor". In the most frequently implemented version of the test, for example, 86% of students were tested in two domains only, for one hour each (see OECD [forthcoming] for details). The number of items that are common to previous assessments was also greatly increased for all domains, and most obviously for minor domains.

The scaling procedure was also improved by forming the calibration sample based on all student responses from the past cycles of the assessment. For the next PISA cycle (2018) the calibration sample will overlap by up to about 75% with the 2015 cycle. As a consequence, the uncertainty due to the re-estimation of item parameters in scaling will be reduced considerably compared to cycles up to 2012.

While these improvements can be expected to result in reductions in the link error between 2015 and future cycles, they may add to the uncertainty reflected in link errors between 2015 and past cycles, because past cycles had a different test design and followed a different scaling procedure.

In addition, PISA 2015 introduced further changes in test administration and scaling:

- **Change in the assessment mode.** Computer-based delivery became the main mode of administration of the PISA test in 2015. All trend items used in PISA 2015 were adapted for delivery on computer. The equivalence between the paper- and computer-based versions of trend items used to measure student proficiency in science, reading, mathematics and financial literacy was assessed on a diverse population of students from all countries/economies that participated in the PISA 2015 assessment as part of an extensive field trial. The results of this mode-effect study, concerning the level of equivalence achieved by items ("scalar" equivalence or "metric" equivalence; see e.g. Davidov, Schmidt and Billiet, 2011; Meredith, 1993) informed the scaling of student responses in the main study. Parameters of scalar- and metric-invariant items were constrained to be the same for the entire calibration sample, including respondents who took them in paper- and computer-based mode (see the section on "Comparing PISA results across paper and computer-based administrations" for further details).
- **Change in the scaling model.** A more flexible statistical model was fitted to student responses when scaling item parameters. This model, whose broadest form is the generalised partial credit model (i.e. a two-parameter item-response-theory model; see Birnbaum, 1968; Muraki, 1992), includes constraints for trend items so as to retain as many trend items with one-parameter likelihood functions as supported by the data, and is therefore referred to as a "hybrid" model. The one-parameter models on which scaling was based in previous cycles (Masters, 1982; Rasch 1960) are a special case of the current model. The main difference between the current hybrid model and previously used one-parameter models is that the hybrid model does not give equal weight to all items when constructing a score, but rather assigns optimal weights to tasks based on their capacity to distinguish between high- and low-ability students. It can therefore better accommodate the diversity of response formats included in PISA tests.
- **Change in the treatment of differential item functioning across countries.** In tests such as PISA, where items are translated into multiple languages, some items in some countries may function differently from how the item functions in the majority of countries. For example, terms that are harder to translate into a specific language are not always avoidable. The resulting item-by-country interactions are a potential threat to validity. In past cycles, common item parameters were used for all countries, except for a very small number of items that were considered "dodgy" and therefore treated as "not administered" for some countries (typically, less than a handful of items, for instance if careless errors in translation or printing were found only late in the process). In 2015, the calibration allowed for a (limited) number of country-by-cycle-specific deviations from the international item parameters (Glas and Jehangir, 2014; Oliveri and von Davier, 2011; Oliveri and von Davier, 2014). This approach preserves the comparability of PISA scores across countries and time, which is ensured by the existence of a sufficient number of invariant items, while reducing the (limited) dependency of country rankings on the selection of items included in the assessment, and thus increasing fairness. The Technical Report for PISA 2015 provides the number of unique parameters for each country/economy participating in PISA (OECD, forthcoming).
- **Change in the treatment of non-reached items.** Finally, in PISA 2015, non-reached items (i.e. unanswered items at the end of test booklets) were treated as not administered, whereas in previous PISA cycles they were considered as wrong answers when estimating student proficiency (i.e. in the "scoring" step) but as not administered when estimating item parameters (in the "scaling" step). This change makes the treatment of student responses consistent across the estimation of item parameters and student proficiency, and eliminates potential advantages for countries and test takers who randomly guess answers to multiple-choice questions that they could not complete in time compared to test takers who leave these non-reached items unanswered. However, this new treatment of non-reached items might result in higher scores than would have been estimated in the past for countries with many unanswered items.

A further change in test administration is specific to the financial literacy assessment:

- **Change in time of administration.** Sampling design and the scheduling of the test changed between the PISA 2012 and PISA 2015 financial literacy assessments. Students assessed in financial literacy in 2012 were tested in financial literacy – as well as in mathematics and reading – at the same time as other students were taking the core assessment; students assessed in financial literacy in 2015 took the test in a separate session after having been tested in mathematics, reading and science. In most participating countries and economies, the financial literacy testing session took place on the afternoon of the same day in a large majority of sampled schools. However, in M974, students in about one in three schools sat the financial literacy test on a different day than the day when they sat the mathematics, reading and science tests. Students in about eight out of ten schools in M265 and M394 sat the financial literacy test on a different day than the main test. Genuine financial literacy trends may be confounded by the change in the scheduling of the assessment, especially in countries and economies where most students sat the financial literacy assessment in the afternoon, as students sitting the financial literacy assessment in the afternoon may have been tired after a long testing day.

Comparing PISA results across paper- and computer-based administrations

The equivalence of link items, assessed at the international level, was established in the extensive mode-effect study that was part of the field trial for PISA 2015. These results provide strong support for the assertion that results can be reported on the same scale across modes. In addition, the possibility of country-by-cycle-specific parameters can, to some extent, account for national deviations from the international norm.

The equivalence of link items was first assessed during the field trial (in 2014) on equivalent populations created by random assignment within schools. More than 40 000 students from the countries and economies that were planning to conduct the PISA 2015 assessment on computers were randomly allocated to the computer- or paper-based mode within each school, so that the distribution of student ability was comparable across the two modes. As a result, it was possible to attribute any differences across modes in students' response patterns, particularly differences that exceeded what could be expected due to random variations alone, to an impact of mode of delivery on the item rather than to students' ability to use the mode of delivery. The field trial was designed to examine mode effects at the international level, but not for each national sample or for subsamples with a country.

The mode-effects study asked two main questions:

- Do the items developed in prior PISA cycles for delivery in paper-based mode measure the same skills when delivered on computer? For instance, do all the science items that were adapted for computer delivery measure science skills only, or do they measure a mixture of science and computer skills?
- Is the difficulty of the paper-based versions of these items the same as that of computer-based versions?

Only if a science, reading or mathematics item measured the same skills and was equally difficult across the two modes was it considered to be fully equivalent (i.e. scalar invariant) and to support meaningful comparisons of performance across modes. This analysis of test equivalence was based on pooled data from all countries/economies using explanatory item-response-theory (IRT) models. In these models, two distinct sets of parameters estimate how informative student responses are about proficiency on the intended scale, and what level of proficiency they indicate. The analysis identified three groups of items:

- **Group 1:** Items that had the same estimated difficulty and discrimination parameters in both modes and were therefore found to be fully equivalent on paper and computer (scalar invariance).
- **Group 2:** Items that had the same discrimination parameter but distinct difficulty parameter (metric invariance). Success on these items did say something about proficiency in the domain, in general; but the difficulty of items varied depending on the mode, often because of interface issues, such as answer formats that required free-hand drawing or the construction of equations. Several items proved to be more difficult on computers, and a few items were easier on computers.
- **Group 3:** Items for which field trial estimates indicated that they measured different skills, depending on the mode (no metric invariance).

Science, reading and mathematics items in Group 3 were not used in the computer-based test in the main study (two items in mathematics were used in the paper- based test only). Items from Group 1 and 2 were used, and the stability of item parameters across cycles and modes was further probed during scaling operations for the main study. These items function as anchor items or link items for scaling purposes and are the basis for comparisons of performance across modes and across time.

The full equivalence of link items across modes, assessed on a population representing all students participating in PISA who took the test on computers, ensures that results can be compared across paper- and computer-based modes, and that the link between these sets of results is solid. It implies, among other things, that if all students who took the PISA 2015 test on computer had taken the same test on paper, their mean score, as well as the proportion of students at the different levels of proficiency, would not have been significantly different.

Annex A6 provides further information on the exploratory analysis of mode-by-group interactions that was carried out on field-trial data. While the results of this analysis, in particular with respect to mode-by-gender interactions, are encouraging, the limitations of field-trial data for this type of exercise must be borne in mind when interpreting results.

Linking PISA 2015 financial literacy results to the existing reporting scale

Given the small number of countries/economies participating in the optional financial literacy assessment in the two cycles, a different procedure was used to link the 2012 and 2015 financial literacy assessments than the one described above for science, reading and mathematics.

Compared to the PISA 2012 design, the PISA 2015 data collection design for financial literacy provides stronger connections to the data collected in other domains. That is, every student who sat the financial literacy assessment also sat the reading or mathematics assessment, or both, in addition to the science assessment. Therefore, PISA 2015 provides a better estimate of the covariance between the core domains and financial literacy. However, because not every country conducted the financial literacy assessment in PISA 2015, there are only a few countries that have data available in both years. As such, the 2015 main survey calibration required data from PISA 2012 as well as the 2015 field trial. This approach provides a sound link for PISA 2015 because, in the 2015 field trial data, a larger group of countries took both the computer-based assessment and the

paper-based assessment (for the mode-effect study). This is also important since the 2015 administration of the financial literacy assessment is based on data collection for a subset of students in a second testing session. All available financial literacy data (2012 main survey, 2015 field trial, and 2015 main survey) were combined for the IRT scaling using a multiple-group IRT model based on an equivalent-groups (for the field trial samples) design for the linking. This particular linking method provides a sound link and is robust against changes in the percent correct observed in the 2015 main survey. Including the field trial data allows for the assumption of equivalent groups since students were randomly assigned in the field trial paper-based versus computer-based assessment.

The equivalent groups design is a method of linking that is common in test equating. While it provides a consistent linking approach, it does not provide information on which items are directly comparable; nor does it require or assume that the items be invariant across assessment modes, since the comparability is established based on the premise that the distribution of student ability is equivalent across groups. The link to financial literacy is established through common populations, while for the other scales (reading, mathematics and science) it was possible to link across modes and assessment cycles using common items.

In the PISA 2015 main survey, the financial literacy domain consists of 43 trend items. No items were excluded from the scaling. The IRT calibration shows a very good fit of the international/common item parameters. The scaling was able to retain common/international item parameters for 92.9% of the items (for 7.1% of the items, unique item parameters had to be estimated) and, thus, a high comparability of the scale across different countries and languages (see OECD [forthcoming] for more information about scaling outcomes).

Quantifying the uncertainty of scale comparability in the link error

Standard errors for estimates of changes in performance and trends across PISA cycles take into account the uncertainty introduced by the linking of scales produced under separate calibrations. These more conservative standard errors (larger than standard errors that were estimated before the introduction of the linking error) reflect not only the measurement precision and sampling variation as for the usual PISA results, but also the linking error. For PISA 2015, the linking error reflects not only the uncertainty due to the selection of link items, but also the uncertainty due to the changes in the scaling methodology introduced in 2015.

As in past cycles, only the uncertainty around the location of scores from past PISA cycles on the 2015 reporting scale is reflected in the link error. Because this uncertainty about the position in the distribution (a change in the intercept) is cancelled out when looking at location-invariant estimates (such as estimates of the variance, the inter-quartile range, gender gaps, regression coefficients, correlation coefficients, etc.), standard errors for these estimates do not include the linking error.

Link error for scores between two PISA assessments

Link errors for PISA 2015 were estimated based on the comparison of rescaled country/economy means per domain with the corresponding means derived from public use files and produced under the original scaling of each cycle. This new approach for estimating the link errors was used for the first time in PISA 2015. The number of observations used for the computation of each link error equals the number of countries with results in both cycles. Because of the sparse nature of the data underlying the computation of the link error, a robust estimate of the standard deviation was used, based on the Sn statistic (Rousseeuw and Croux, 1993).

This volume presents comparisons of performance in PISA 2015 and PISA 2012, using the link errors presented in Table A5.1.

[Part 1/1]

Table A5.1 Link errors for comparisons between PISA 2015 and PISA 2012

	PISA 2012 to 2015
Science	3.9228
Reading	5.2535
Mathematics	3.5462
Financial literacy	5.3309

Link error for other types of comparisons of student performance

The link error for comparisons based on non-linear transformations of scale scores can be estimated by simulation, based on the link error for comparison of scores between two PISA assessments. In particular, Table A5.2 presents the estimates of the link error for the comparison of the percentage of students performing below Level 2 and at or above Level 5.

The estimation of the link errors for the percentage of students performing below Level 2 and at or above Level 5 uses the assumption that the magnitude of the uncertainty associated with the linking of scales follows a normal distribution with a mean of 0 and a standard deviation equal to the scale link error shown in Table A5.1. From this distribution, 500 errors are drawn and added to the first plausible value of each country's/economy's 2015 students, to represent the 500 possible scenarios in which the only source of differences with respect to 2015 is the uncertainty in the link.

By computing the estimate of interest (such as the percentage of students in a particular proficiency level) for each of the 500 replicates, it is possible to assess how the scale link error influences this estimate. The standard deviation of the 500 replicate estimates is used as the link error for the change in the percentage of students scoring in a particular proficiency level. Because the influence of the scale link error on this estimate depends on the exact shape and density of the performance distribution around the cut-off points, link errors for comparisons of proficiency levels are different for each country, and within countries, for boys and girls.

Comparisons of performance: Difference between two assessments

To evaluate the evolution of performance, analyses in this volume report the change in performance between the 2015 and 2012 cycles. Comparisons between two assessments (e.g. a country's/economy's change in performance between PISA 2012 and PISA 2015 or the change in performance of a subgroup) are calculated as:

$$\Delta_{2015\text{-}t} = PISA_{2015} - PISA_{t}$$

where $\Delta_{2015\text{-t}}$ is the difference in performance between PISA 2015 and a previous PISA assessment (comparisons are only possible when the subject first became a major domain or later assessment cycles) $PISA_{2015}$ is the mathematics, reading, science or financial literacy score observed in PISA 2015, and PISAt is the mathematics, reading, science or financial literacy score observed in a previous assessment. The standard error of the change in performance $\sigma(\Delta_{2015\text{-}t})$ is:

$$\sigma(\Delta_{2015\text{-}t}) = \sqrt{\sigma_{2015}^2 + \sigma_t^2 + error_{2015,t}^2}$$

where σ_{2015} is the standard error observed for $PISA_{2015}$, σ_t is the standard error observed for $PISA_t$ and $error_{2015,t}$ is the link error for comparisons of science, reading or financial literacy performance between the PISA 2015 assessment and a previous (t) assessment. The value for $error_{2015,t}$ is shown in Table A5.1 for most of the comparisons and Table A5.2 for comparisons of proficiency levels.

Adjusted trends

PISA maintains its technical standards over time. Although this means that trends can be calculated over populations defined in a consistent way, the share of the 15-year-old population that this represents, and/or the demographic characteristics of 15-year-old students can also be subject to change, for example because of migration.

Because trend analyses illustrate the pace of progress of successive cohorts of students, in order to draw reliable conclusions from such results, it is important to examine the extent to which they are driven by changes in the demographic characteristics of students included in the sample. In this volume, two sets of trend results were therefore developed: unadjusted trends and adjusted trends accounting for changes in the demographic characteristics of the sample. Adjusted trends represent trends in performance estimated after neutralising the impact of concurrent changes in the demographic characteristics of the sample.

Adjusted trends accounting for changes in the demographic characteristics of the sample

A re-weighting procedure, analogous to post-stratification, is used to adjust the sample characteristics of past samples to the observed composition of the PISA 2015 sample.

In a first step, the sample included in each assessment cycle is divided into discrete cells, defined by the students' immigrant status (four categories: non-immigrant, first-generation, second-generation, missing), gender (two categories: boy, girl) and relative age (four categories, corresponding to four three-month periods). The few observations included in past PISA datasets with missing gender or age are deleted. This defines, at most, 32 discrete cells for the entire population. However, whenever the number of observations included in one of these 32 cells is less than 10 for a certain country/economy and PISA assessment, the corresponding cell is combined with another, similar cell, according to a sequential algorithm, until all cells reach a minimum sample size of 10.[4]

In a second step, the cells are reweighted so that the sum of final student weights within each cell is constant across assessments, and equal to the sum of final student weights in the PISA 2015 sample. Estimates of the mean and distribution of student performance are then performed on these reweighted samples, representing the (counterfactual) performance that would have been observed, had the samples from previous years had the same composition of the sample in PISA 2015 in terms of the variables used in this re-weighting procedure.

Table A5.3 provides, for each country/economy, the number of cells used for post-stratification, as well as, for each cycle, the number of observations excluded from trends accounting for changes in the demographic characteristics of the sample.

Comparing non-performance items and scales across PISA cycles

To gather information about students' and schools' characteristics, PISA asks both students and school principals to complete a background questionnaire. Between PISA 2012 and PISA 2015, several questions remained the same, allowing for a comparison of responses to these questions over time. Questions with subtle word changes or questions with major word changes were not compared across time (unless otherwise noted) because it is impossible to discern whether observed changes in the response are due to changes in the construct they are measuring or to changes in the way the construct is being measured.

OECD average

Throughout this report, the OECD average is used as a benchmark. It is calculated as the average across OECD countries and economies, weighting each country equally. Some OECD countries did not participate in certain assessments; other OECD countries and economies do not have comparable results for some assessments; still others did not include certain questions in their questionnaires or changed them substantially from assessment to assessment. In trends tables and figures, the OECD average is reported on consistent sets of OECD countries and economies. For instance, the "OECD average 7" includes only 7 OECD countries and economies that have non-missing observations for both the PISA 2012 and PISA 2015 assessments. This restriction allows for valid comparisons of the OECD average over time.

Tables available on line

Table A5.2. Link errors for comparisons of proficiency levels between PISA 2015 and PISA 2012
(http://dx.doi.org/10.1787/888933486300)

Table A5.3. Cells used to adjust financial literacy scores to the PISA 2015 samples
(http://dx.doi.org/10.1787/888933486315)

Notes

1. Also see Carstensen (2013) for the influence of test design on trend measurement.

2. The limited treatment of DIF in past cycles, combined with the cycle-specific calibration sample, has been criticised for leading to trend estimates that are inconsistent with national calibrations using concurrent samples (Urbach, 2013).

3. The number of not reached items is used in PISA 2015 as a source of background information in the generation of plausible values, so that the correlation of not-reached items and proficiency is modelled and accounted for in the results.

4. Samples are always first separated by immigrant status (unless this would result in groups with fewer than 10 observations), then, within groups defined by immigrant status, by gender (unless this would result in groups with fewer than 10 observations), and finally by age groups. At any stage, if there are groups with fewer than 10 observations, the following mergers are done; within each stage, the sequence of mergers stops as soon as all groups reach a minimum size of 10. Step 1 (immigrant status, within language groups defined previously): merge missing and non-immigrant; merge "first generation" and "second generation"; merge all categories. Step 2 (gender, within immigrant groups defined previously): merge boys and girls. Step 3 (age, within immigrant/gender groups defined previously): merge first and second quarter; merge third and fourth quarter; merge all categories.

References

Birnbaum, A. (1968), *On the Estimation of Mental Ability*, Series Report 15, USAF School of Aviation Medicine, Randolph Air Force Base (TX).

Carstensen, C.H. (2013), "Linking PISA competencies over three cycles – Results from Germany", pp. 199-213 in *Research on PISA*, Springer, Netherlands, http://dx.doi.org/10.1007/978-94-007-4458-5_12.

Davidov, E., P. Schmidt and **J. Billiet** (eds.) (2011), *Cross-Cultural Analysis: Methods and Applications*. Routledge, New York.

Glas, C. and **K. Jehangir** (2014), "Modeling country specific differential item functioning", in *Handbook of International Large-Scale Assessment*, CRC Press, Boca Raton (FL).

Masters, G.N. (1982), "A Rasch model for partial credit scoring." *Psychometrika*, Vol.47/2, pp. 149-74, http://dx.doi.org/10.1007/BF02296272.

Meredith, W. (1993), "Measurement invariance, factor analysis and factorial invariance", *Psychometrika*, Vol. 58/4, pp. 525-43, http://dx.doi.org/10.1007/BF02294825.

Muraki, E. (1992), "A generalized partial credit model: Application of an EM algorithm" *Applied Psychological Measurement*, Vol. 16/2, pp. 159-76, http://dx.doi.org/10.1177/014662169201600206.

OECD (forthcoming), *PISA 2015 Technical Report*, PISA, OECD Publishing, Paris.

OECD (2009), *PISA 2006 Technical Report*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264048096-en.

Oliveri, M.E. and **M. von Davier** (2014), "Toward increasing fairness in score scale calibrations employed in international Large-Scale Assessments" *International Journal of Testing*, Vol. 14/1, pp. 1-21, http://dx.doi.org/10.1080/15305058.2013.825265.

Oliveri, M.E. and **M. von Davier** (2011), "Investigation of model fit and score scale comparability in international assessments" *Pyschological Test and Assessment Modeling*, Vol. 53/1, pp. 315-33.

Rasch, G (1960), *Probabilistic Models for Some Intelligence and Attainment Tests,* Nielsen & Lydiche, Copenhagen.

Rousseeuw, P.J. and **C. Croux** (1993), "Alternatives to the median absolute deviation", *Journal of the American Statistical Association*, Vol. 88/424, pp. 1273-83, http://dx.doi.org/10.1080/01621459.1993.10476408.

Urbach, D. (2013), "An investigation of Australian OECD PISA trend results", in *Research on PISA*, pp. 165-79, Springer Netherlands, http://dx.doi.org/10.1007/978-94-007-4458-5_10.

ANNEX A6
THE PISA 2015 FIELD TRIAL MODE-EFFECT STUDY

Available on line only.

It can be found at: www.oecd.org/pisa