11

Sampling outcomes

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.

This chapter reports on PISA sampling outcomes. Details of the sample design are provided in Chapter 4.

POPULATION COVERAGE

Tables 11.1 and 11.2 (by adjudicated regions) show the quality indicators for population coverage and the information used to develop them. The following notes explain the meaning of each coverage index and how the data in each column of the table were used.

Coverage indices 1, 2 and 3 are intended to measure PISA population coverage. Coverage indices 4 and 5 are intended to be diagnostic in cases where indices 1, 2 or 3 have unexpected values. Many references are made in this chapter to the various sampling tasks on which National Project Managers (NPMs) documented statistics and other information needed in undertaking the sampling of schools and students. Note that although no comparison is made between the total population of 15-year-olds and the enrolled population of 15-year-old students, generally the enrolled population was expected to be less than or equal to the total population. Occasionally this was not the case due to differing data sources for these two values.

Coverage index 1: Coverage of the national population, calculated by $P/(P + E) \times$ (ST7b_3/ST7b_1):

- Coverage index 1 shows the extent to which the weighted participants covered the final target population after all school exclusions. The following bullet points give details of its computation.
- In the preceding expression $P/(P + E)$ broadly represents the coverage proportion due to within-school exclusion, and (ST7b_3/ST7b_1) the coverage proportion due to school-level exclusion.
- The national population value, defined by sampling task 7b response box [1] and denoted here as ST7b_1 (and in Table 11.1 as the target population) is the population that includes all enrolled 15-year-old students in grades 7 and above in each participating country (with the possibility of small levels of exclusions), based on national statistics. However, the final national population value reflected for each country's school sampling frame might have had some school-level exclusions. The value that represents the population of enrolled 15-year-old students minus those in excluded schools is represented initially by response box [3] on sampling task 7b. It is denoted here as ST7b_3. As in PISA 2012, the procedure for PISA 2015 was that small schools having only one or two PISA-eligible students could not be excluded from the school frame but could be excluded in the field if the school still had only one or two PISA-eligible students at the time of data collection. Therefore, what is noted in coverage index 1 as ST7b_3 (and in Table 11.1 as target minus school-level exclusions) was a number after accounting for all school-level exclusions, which means a number that omits schools excluded from the sampling frame in addition to those schools excluded in the field. Thus, the term (ST7b_3/ST7b_1) provides the proportion of the national population covered in each country based on national statistics.
- The value $(P + E)$ provides the weighted estimate from the student sample of all PISA-eligible 15-year-olds in each participating country, where P is the weighted estimate of PISA-eligible non-excluded 15-year-old students and E is the weighted estimate of PISA-eligible 15-year-old students that were excluded within schools. Therefore, the term $P/(P + E)$ provides an estimate, based on the student sample, of the proportion of the PISA-eligible 15-year-old population represented by the non-excluded PISA-eligible 15-year-old students.
- The result of multiplying these two proportions together $P/(P + E)$ and (ST7b_3/ST7b_1) indicates the overall proportion of the national population covered by the non-excluded portion of the student sample.

Coverage index 2: Coverage of the national enrolled population, calculated by $P/(P + E) \times$ (ST7b_3/ST7a_2.1):

- Coverage index 2 shows the extent to which the weighted participants covered the target population of all enrolled students in grades 7 and above.
- The national enrolled population (NEP), defined by sampling task 7a response box [2.1] and denoted here as ST7a_2.1 (and as enrolled 15-year-old students in Table 11.1), is the population that includes all enrolled 15-year-old students in grades 7 and above in each participating country, based on national statistics. The final national population, denoted here as ST7b_3 as described above for coverage index 1, reflects the 15-year-old population after school-level and other small exclusions. This value represents the population of enrolled 15-year-old students less those in excluded schools.
- The value $(P + E)$ provides the weighted estimate from the student sample of all eligible 15-year-olds in each country, where P is the weighted estimate of PISA-eligible non-excluded 15-year-old students and E is the weighted estimate of PISA-eligible 15-year-old students that were excluded within schools. Therefore, the term $P/(P + E)$ provides an

estimate based on the student sample of the proportion of the PISA-eligible 15-year-old population that is represented by the non-excluded PISA-eligible 15-year-old students.

- Multiplying these two proportions together (*P*/(*P* + *E*) and (ST7b_3/ST7a_2.1)) gives the overall proportion of the NEP that was covered by the non-excluded portion of the student sample.

Coverage index 1 and coverage index 2 will differ when countries have excluded geographical areas or language groups apart from other school-level exclusions. In these cases coverage index 2 will be less than coverage index 1.

Coverage index 3: Coverage of the national 15-year-old population, calculated by *P*/ST7a_1:

- The national population of 15-year-olds, defined by sampling task 7a response box [1] and denoted here as ST7a_1 (and called all 15-year-olds in Table 11.1), is the entire population of 15-year-olds in each country (enrolled and not enrolled), based on national statistics. The value *P* is the weighted estimate of PISA-eligible non-excluded 15-year-old students from the student sample. Thus (*P*/ST7a_1) indicates the proportion of the national population of 15-year-olds covered by the non-excluded portion of the student sample. It therefore also reflects the proportion of 15-year-olds excluded or not at school.

Coverage index 4: Coverage of the estimated school population, calculated by (*P* + *E*)/*S*:

- The value (*P* + *E*) provides the weighted estimate from the student sample of all PISA-eligible 15-year-old students in each country, where P is the weighted estimate of PISA-eligible non-excluded 15-year-old students and *E* is the weighted estimate of PISA-eligible 15-year-old students who were excluded within schools.
- The value *S* is an estimate of the 15-year-old school population in each participating country (called estimate of enrolled students from frame in Table 11.1). This is based on the actual or (more often) approximate number of 15-year-old students enrolled in each school in the sample, prior to contacting the school to conduct the assessment. The *S* value is calculated as the sum over all sampled schools of the product of each school's sampling weight and its number of 15-year-old students (*ENR*) as recorded on the school sampling frame.
- Thus, (*P* + *E*)/*S* is the proportion of the estimated school 15-year-old population that is represented by the weighted estimate from the student sample of all PISA-eligible 15-year-old students. It is influenced by the accuracy of the school sample frame, fluctuations in the target population size and the accuracy of the within-school sampling process. Its purpose is to check whether the student sampling has been carried out correctly, and to assess whether the value of *S* is a reliable measure of the number of enrolled 15-year-olds. This is important for interpreting coverage index 5.

Coverage index 5: Coverage of the school sampling frame population, calculated by *S*/ST7b_3:

- The value (*S*/ST7b_3) is the ratio of the enrolled 15-year-old population, as estimated from data on the school sampling frame, to the size of the enrolled student population, as reported on sampling task 7b and adjusted by removing any additional excluded schools in the field. In some cases, this provided a check as to whether the data on the sampling frame gave a reliable estimate of the number of 15-year-old students in each school. In other cases, however, it was evident that ST7b_3 had been derived using data from the sampling frame by the NPM, so that this ratio may have been close to 1.0 even if enrolment data on the school sampling frame were poor. Under such circumstances, coverage index 4 would differ noticeably from 1.0, and the figure for ST7b_3 would also be inaccurate.

SCHOOL AND STUDENT RESPONSE RATES

Tables 11.3 to 11.8 present school and student-level response rates at the national and regional levels.

- Tables 11.3 and 11.4 (by adjudicated regions) indicate the rates calculated by using only original schools and no replacement schools.
- Tables 11.5 and 11.6 (by adjudicated regions) indicate the improved response rates when first and second replacement schools were accounted for in the rates.
- Tables 11.7 and 11.8 (by adjudicated regions) indicate the student response rates among the full set of participating schools.

[Part 1/2]

Table 11.1 **PISA target populations and samples**

		All 15-year-olds	Enrolled 15-year-olds	Target population	School-level exclusions	Target minus school level exclusions	School level exclusion rate (%)	Estimation of enrolled students from frame	Number of participating students	Weighted number of participating students	Number of excluded students
OECD	Australia	282 888	282 547	282 547	6 940	275 607	2.46	276 072	14 530	256 329	681
	Austria	88 013	82 683	82 683	790	81 893	0.96	81 730	7 007	73 379	84
	Belgium	123 630	121 954	121 694	1 597	120 097	1.31	118 915	9 651	114 902	39
	Canada	396 966	381 660	376 994	1 590	375 404	0.42	381 133	20 058	331 546	1 830
	Chile	255 440	245 947	245 852	2 641	243 211	1.07	232 756	7 053	203 782	37
	Czech Republic	90 391	90 076	90 076	1 814	88 262	2.01	87 999	6 894	84 519	25
	Denmark	68 174	67 466	67 466	605	66 861	0.90	63 897	7 161	60 655	514
	Estonia	11 676	11 491	11 491	416	11 075	3.62	11 154	5 587	10 834	116
	Finland	58 526	58 955	58 955	472	58 483	0.80	58 782	5 882	56 934	124
	France	807 867	778 679	778 679	28 742	749 937	3.69	749 284	6 108	734 944	35
	Germany	774 149	774 149	774 149	11 150	762 999	1.44	794 206	6 522	743 969	54
	Greece	105 530	105 253	105 253	953	104 300	0.91	103 031	5 532	96 157	58
	Hungary	94 515	90 065	90 065	1 945	88 120	2.16	89 808	5 658	84 644	55
	Iceland	4 250	4 195	4 195	17	4 178	0.41	4 163	3 374	3 966	131
	Ireland	61 234	59 811	59 811	72	59 739	0.12	61 461	5 741	59 082	197
	Israel	124 852	118 997	118 997	2 310	116 687	1.94	115 717	6 598	117 031	115
	Italy	616 761	567 268	567 268	11 190	556 078	1.97	516 113	11 583	495 093	246
	Japan	1 201 615	1 175 907	1 175 907	27 323	1 148 584	2.32	1 151 305	6 647	1 138 349	2
	Korea	620 687	619 950	619 950	3 555	616 395	0.57	615 107	5 581	569 106	20
	Latvia	17 255	16 955	16 955	677	16 278	3.99	16 334	4 869	15 320	70
	Luxembourg	6 327	6 053	6 053	162	5 891	2.68	5 891	5 299	5 540	331
	Mexico	2 257 399	1 401 247	1 401 247	5 905	1 395 342	0.42	1 373 919	7 568	1 392 995	30
	Netherlands	201 670	200 976	200 976	6 866	194 110	3.42	191 966	5 385	191 817	14
	New Zealand	60 162	57 448	57 448	681	56 767	1.19	56 875	4 520	54 274	333
	Norway	63 642	63 491	63 491	854	62 637	1.35	61 809	5 456	58 083	345
	Poland	380 366	361 600	361 600	6 122	355 478	1.69	355 158	4 478	345 709	34
	Portugal	110 939	101 107	101 107	424	100 683	0.42	102 193	7 325	97 214	105
	Slovak Republic	55 674	55 203	55 203	1 376	53 827	2.49	54 499	6 350	49 654	114
	Slovenia	18 078	17 689	17 689	290	17 399	1.64	17 286	6 406	16 773	114
	Spain	440 084	414 276	414 276	2 175	412 101	0.53	409 246	6 736	399 935	200
	Sweden	97 749	97 210	97 210	1 214	95 996	1.25	94 097	5 458	91 491	275
	Switzerland	85 495	83 655	83 655	2 320	81 335	2.77	81 026	5 860	82 223	107
	Turkey	1 324 089	1 100 074	1 100 074	5 746	1 094 328	0.52	1 091 317	5 895	925 366	31
	United Kingdom	747 593	746 328	746 328	23 412	722 916	3.14	707 415	14 157	627 703	870
	United States	4 220 325	3 992 053	3 992 053	12 001	3 980 052	0.30	3 902 089	5 712	3 524 497	193
Partners	Albania	48 610	45 163	45 163	10	45 153	0.02	43 919	5 215	40 896	0
	Algeria	389 315	354 936	354 936		354 936	0.00	355 216	5 519	306 647	0
	Argentina	718 635	578 308	578 308	2 617	575 691	0.45	572 941	6 349	394 917	21
	Brazil	3 803 681	2 853 388	2 853 388	64 392	2 788 996	2.26	2 692 686	23 141	2 425 961	119
	B-S-J-G (China)*	2 084 958	1 507 518	1 507 518	58 639	1 448 879	3.89	1 437 201	9 841	1 331 794	33
	Bulgaria	66 601	59 397	59 397	1 124	58 273	1.89	56 483	5 928	53 685	49
	Colombia	760 919	674 079	674 079	37	674 042	0.01	673 817	11 795	567 848	9
	Costa Rica	81 773	66 524	66 524		66 524	0.00	67 073	6 866	51 897	13
	Croatia	45 031	35 920	35 920	805	35 115	2.24	34 652	5 809	40 899	86
	Cyprus[1]	9 255	9 255	9 253	109	9 144	1.18	9 126	5 571	8 785	228
	Dominican Republic	193 153	139 555	139 555	2 382	137 173	1.71	138 187	4 740	132 300	4
	FYROM	16 719	16 717	16 717	259	16 458	1.55	16 472	5 324	15 847	8
	Georgia	48 695	43 197	43 197	1 675	41 522	3.88	41 595	5 316	38 334	35
	Hong Kong (China)	65 100	61 630	61 630	708	60 922	1.15	60 716	5 359	57 662	36
	Indonesia	4 534 216	3 182 816	3 182 816	4 046	3 178 770	0.13	3 176 076	6 513	3 092 773	0
	Jordan	126 399	121 729	121 729	71	121 658	0.06	119 024	7 267	108 669	70
	Kazakhstan	211 407	209 555	209 555	7 475	202 080	3.57	202 701	7 841	192 909	0
	Kosovo	31 546	28 229	28 229	1 156	27 073	4.10	26 924	4 826	22 333	50
	Lebanon	64 044	62 281	62 281	1 300	60 981	2.09	60 882	4 546	42 331	0
	Lithuania	33 163	32 097	32 097	573	31 524	1.79	31 588	6 525	29 915	227
	Macao (China)	5 100	4 417	4 417	3	4 414	0.07	4 414	4 476	4 507	0
	Malaysia	540 000	448 838	448 838	2 418	446 420	0.54	446 237	8 861	412 524	41
	Malta	4 397	4 406	4 406	63	4 343	1.43	4 343	3 634	4 296	41
	Moldova	31 576	30 601	30 601	182	30 419	0.59	30 145	5 325	29 341	21
	Montenegro	7 524	7 506	7 506	40	7 466	0.53	7 312	5 665	6 777	300
	Peru	580 371	478 229	478 229	6 355	471 874	1.33	470 651	6 971	431 738	13
	Qatar	13 871	13 850	13 850	380	13 470	2.74	13 470	12 083	12 951	193
	Romania	176 334	176 334	176 334	1 823	174 511	1.03	172 652	4 876	164 216	3
	Russian Federation	1 176 473	1 172 943	1 172 943	24 217	1 148 726	2.06	1 189 441	6 036	1 120 932	13
	Singapore	48 218	47 050	47 050	445	46 605	0.95	46 620	6 115	46 224	25
	Chinese Taipei	295 056	287 783	287 783	1 179	286 604	0.41	286 778	7 708	251 424	22
	Thailand	895 513	756 917	756 917	9 646	747 271	1.27	751 010	8 249	634 795	22
	Trinidad and Tobago	17 371	17 371	17 371		17 371	0.00	17 371	4 692	13 197	0
	Tunisia	122 186	122 186	122 186	679	121 507	0.56	122 767	5 375	113 599	3
	United Arab Emirates	51 687	51 518	51 499	994	50 505	1.93	50 060	14 167	46 950	63
	Uruguay	53 533	43 865	43 865	4	43 861	0.01	43 737	6 062	38 287	6
	Viet Nam	1 803 552	1 032 599	1 032 599	6 557	1 026 042	0.63	996 757	5 826	874 859	0

* B-S-J-G (China) refers to the four PISA-participating China provinces: Beijing, Shanghai, Jiangsu and Guangdong.
1. Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
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.

[Part 2/2]

Table 11.1 PISA target populations and samples

		Weighted number of excluded students	Number of ineligible students	Weighted number of ineligible students	Within-school exclusion rate (%)	Overall exclusion rate (%)	Percentage of ineligible / withdrawn	Coverage Index 1	Coverage Index 2	Coverage Index 3	Coverage Index 4	Coverage Index 5
OECD	Australia	7 736	904	8 203	2.93	5.31	3.11	0.95	0.95	0.91	0.96	1.00
	Austria	866	669	3 431	1.17	2.11	4.62	0.98	0.98	0.83	0.91	1.00
	Belgium	410	147	1 576	0.36	1.66	1.37	0.98	0.98	0.93	0.97	0.99
	Canada	25 340	864	9 513	7.10	7.49	2.67	0.93	0.91	0.84	0.94	1.02
	Chile	1 393	114	3 782	0.68	1.75	1.84	0.98	0.98	0.80	0.88	0.96
	Czech Republic	368	82	825	0.43	2.44	0.97	0.98	0.98	0.94	0.96	1.00
	Denmark	2 644	48	289	4.18	5.04	0.46	0.95	0.95	0.89	0.99	0.96
	Estonia	218	34	61	1.97	5.52	0.55	0.94	0.94	0.93	0.99	1.01
	Finland	1 157	13	124	1.99	2.78	0.21	0.97	0.97	0.97	0.99	1.01
	France	3 620	157	16 455	0.49	4.16	2.23	0.96	0.96	0.91	0.99	1.00
	Germany	5 342	110	11 334	0.71	2.14	1.51	0.98	0.98	0.96	0.94	1.04
	Greece	965	87	1 616	0.99	1.89	1.66	0.98	0.98	0.91	0.94	0.99
	Hungary	1 009	48	769	1.18	3.31	0.90	0.97	0.97	0.90	0.95	1.02
	Iceland	132	179	181	3.23	3.62	4.40	0.96	0.96	0.93	0.98	1.00
	Ireland	1 825	117	1 033	3.00	3.11	1.70	0.97	0.97	0.96	0.99	1.03
	Israel	1 803	78	1 323	1.52	3.43	1.11	0.97	0.97	0.94	1.03	0.99
	Italy	9 395	305	11 766	1.86	3.80	2.33	0.96	0.96	0.80	0.98	0.93
	Japan	318	12	1 868	0.03	2.35	0.16	0.98	0.98	0.95	0.99	1.00
	Korea	1 806	65	6 268	0.32	0.89	1.10	0.99	0.99	0.92	0.93	1.00
	Latvia	174	153	430	1.12	5.07	2.77	0.95	0.95	0.89	0.95	1.00
	Luxembourg	331	24	24	5.64	8.16	0.41	0.92	0.92	0.88	1.00	1.00
	Mexico	6 810	505	84 669	0.49	0.91	6.05	0.99	0.99	0.62	1.02	0.98
	Netherlands	502	20	592	0.26	3.67	0.31	0.96	0.96	0.95	1.00	0.99
	New Zealand	3 112	114	1 102	5.42	6.54	1.92	0.93	0.93	0.90	1.01	1.00
	Norway	3 366	43	445	5.48	6.75	0.72	0.93	0.93	0.91	0.99	0.99
	Poland	2 418	22	1 505	0.69	2.38	0.43	0.98	0.98	0.91	0.98	1.00
	Portugal	860	239	2 699	0.88	1.29	2.75	0.99	0.99	0.88	0.96	1.01
	Slovak Republic	912	130	999	1.80	4.25	1.98	0.96	0.96	0.89	0.93	1.01
	Slovenia	247	75	144	1.45	3.07	0.84	0.97	0.97	0.93	0.98	0.99
	Spain	10 893	45	2 366	2.65	3.16	0.58	0.97	0.97	0.91	1.00	0.99
	Sweden	4 324	46	715	4.51	5.71	0.75	0.94	0.94	0.94	1.02	0.98
	Switzerland	1 357	146	1 659	1.62	4.35	1.99	0.96	0.96	0.96	1.03	1.00
	Turkey	5 359	533	73 779	0.58	1.10	7.93	0.99	0.99	0.70	0.85	1.00
	United Kingdom	34 747	297	8 914	5.25	8.22	1.35	0.92	0.92	0.84	0.94	0.98
	United States	109 580	330	191 378	3.02	3.31	5.27	0.97	0.97	0.84	0.93	0.98
Partners	Albania	0	0	0	0.00	0.02	0.00	1.00	1.00	0.84	0.93	0.97
	Algeria	0	0	0	0.00	0.00	0.00	1.00	1.00	0.79	0.86	1.00
	Argentina	1 367	204	11 847	0.34	0.80	2.99	0.99	0.99	0.55	0.69	1.00
	Brazil	13 543	1 582	143 969	0.56	2.80	5.90	0.97	0.97	0.64	0.91	0.97
	B-S-J-G (China)	3 609	552	94 478	0.27	4.15	7.07	0.96	0.96	0.64	0.93	0.99
	Bulgaria	433	74	681	0.80	2.68	1.26	0.97	0.97	0.81	0.96	0.97
	Colombia	507	621	30 813	0.09	0.09	5.42	1.00	1.00	0.75	0.84	1.00
	Costa Rica	98	400	3 154	0.19	0.19	6.07	1.00	1.00	0.63	0.78	1.01
	Croatia	589	73	456	1.42	3.63	1.10	0.96	0.96	0.91	1.20	0.99
	Cyprus[1]	292	89	114	3.22	4.36	1.25	0.96	0.96	0.95	0.99	1.00
	Dominican Republic	106	102	2 500	0.08	1.79	1.89	0.98	0.98	0.68	0.96	1.01
	FYROM	19	162	451	0.12	1.67	2.84	0.98	0.98	0.95	0.96	1.00
	Georgia	230	72	515	0.60	4.45	1.34	0.96	0.96	0.79	0.93	1.00
	Hong Kong (China)	374	10	102	0.65	1.79	0.18	0.98	0.98	0.89	0.96	1.00
	Indonesia	0	261	124 725	0.00	0.13	4.03	1.00	1.00	0.68	0.97	1.00
	Jordan	1 006	448	6 256	0.92	0.97	5.70	0.99	0.99	0.86	0.92	0.98
	Kazakhstan	0	0	0	0.00	3.57	0.00	0.96	0.96	0.91	0.95	1.00
	Kosovo	174	215	1 010	0.77	4.84	4.49	0.95	0.95	0.71	0.84	0.99
	Lebanon	0	0	0	0.00	2.09	0.00	0.98	0.98	0.66	0.70	1.00
	Lithuania	1 050	68	282	3.39	5.12	0.91	0.95	0.95	0.90	0.98	1.00
	Macao (China)	0	28	28	0.00	0.07	0.62	1.00	1.00	0.88	1.02	1.00
	Malaysia	2 344	232	13 167	0.56	1.10	3.17	0.99	0.99	0.76	0.93	1.00
	Malta	41	9	9	0.95	2.36	0.21	0.98	0.98	0.98	1.00	1.00
	Moldova	118	34	194	0.40	0.99	0.66	0.99	0.99	0.93	0.98	0.99
	Montenegro	332	72	78	4.66	5.17	1.10	0.95	0.95	0.90	0.97	0.98
	Peru	745	329	20 685	0.17	1.50	4.78	0.99	0.99	0.74	0.92	1.00
	Qatar	193	389	392	1.47	4.17	2.99	0.96	0.96	0.93	0.98	1.00
	Romania	120	117	3 991	0.07	1.11	2.43	0.99	0.99	0.93	0.95	0.99
	Russian Federation	2 469	32	5 732	0.22	2.28	0.51	0.98	0.98	0.95	0.94	1.04
	Singapore	179	51	303	0.39	1.33	0.65	0.99	0.99	0.96	1.00	1.00
	Chinese Taipei	647	80	2 420	0.26	0.67	0.96	0.99	0.99	0.85	0.88	1.00
	Thailand	2 107	424	36 993	0.33	1.60	5.81	0.98	0.98	0.71	0.85	1.01
	Trinidad and Tobago	0	206	421	0.00	0.00	3.19	1.00	1.00	0.76	0.76	1.00
	Tunisia	61	144	2 592	0.05	0.61	2.28	0.99	0.99	0.93	0.93	1.01
	United Arab Emirates	152	170	714	0.32	2.25	1.52	0.98	0.98	0.91	0.94	0.99
	Uruguay	32	522	2 900	0.08	0.09	7.57	1.00	1.00	0.72	0.88	1.00
	Viet Nam	0	144	24 954	0.00	0.63	2.85	0.99	0.99	0.49	0.88	0.97

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

[Part 1/2]

Table 11.2 **PISA target populations and samples, by adjudicated regions**

		All 15-year-olds	Enrolled 15-year-olds	Target population	School-level exclusions	Target minus school level exclusions	School level exclusion rate (%)	Estimation of enrolled students from frame	Number of participating students	Weighted number of participating students	Number of excluded students
OECD	Belgium (Flemish community)	70 451	68 173	68 173	997	67 176	1.46	65 298	5 675	62 986	16
	Spain (Andalusia)	88 493	82 495	82 495	251	82 244	0.30	82 193	1 813	81 642	44
	Spain (Aragon)	11 737	11 192	11 192	48	11 144	0.43	11 126	1 798	10 758	38
	Spain (Asturias)	7 391	7 186	7 186	27	7 159	0.38	7 066	1 790	6 895	24
	Spain (Balearic Islands)	10 629	9 623	9 623	60	9 563	0.63	9 502	1 797	9 208	38
	Spain (Basque Country)	18 455	18 117	18 117	60	18 057	0.33	18 113	3 612	17 424	64
	Spain (Canary Islands)	21 848	20 192	20 192	70	20 122	0.35	20 229	1 842	19 447	40
	Spain (Cantabria)	4 821	4 775	4 775	19	4 756	0.40	4 780	1 924	4 576	17
	Spain (Castile and Leon)	20 057	19 690	19 690	84	19 606	0.43	19 602	1 858	18 004	98
	Spain (CastileLaMancha)	21 165	19 646	19 646	115	19 531	0.59	19 543	1 889	19 247	35
	Spain (Catalonia)	70 633	68 278	68 278	612	67 666	0.90	67 606	1 769	63 112	92
	Spain (Extremadura)	10 955	10 745	10 745	64	10 681	0.60	10 592	1 809	10 054	40
	Spain (Galicia)	20 949	19 616	19 616	69	19 547	0.35	19 617	1 865	19 063	45
	Spain (La Rioja)	2 934	2 853	2 853	33	2 820	1.16	2 822	1 461	2 758	5
	Spain (Madrid)	58 569	53 865	53 865	383	53 482	0.71	53 137	1 808	53 240	21
	Spain (Murcia)	15 690	14 044	14 044	62	13 982	0.44	14 015	1 796	13 555	60
	Spain (Navarra)	6 192	5 856	5 856	27	5 829	0.46	5 793	1 874	5 496	53
	Spain (Valencia)	47 367	44 072	44 072	198	43 874	0.45	43 204	1 625	38 900	144
	United Kingdom (Scotland)	56 171	56 344	56 344	897	55 447	1.59	55 282	3 111	50 190	207
	United States (Massachusetts (public))	80 631	82 745	71 900	18	71 882	0.03	69 899	1 652	60 918	81
	United States (North Carolina (public))	130 833	116 807	110 215	416	109 799	0.38	110 786	1 887	104 161	89
	United States (Puerto Rico)[1]	50 321	44 613	44 613	760	43 853	1.70	39 453	1 398	30 261	24
Partners	Argentina (CABA)	30 974	35 767	35 767	12	35 755	0.03	35 576	1 657	32 180	6
	United Arab Emirates (Abu Dhabi)	19 702	19 629	19 611	204	19 407	1.04	19 402	3 610	18 335	8
	United Arab Emirates (Dubai)	14 662	14 643	14 642	579	14 063	3.95	14 057	6 287	12 906	51

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.

[Part 2/2]

Table 11.2 **PISA target populations and samples, by adjudicated regions**

		Weighted number of excluded students	Number of ineligible students	Weighted number of ineligible students	Within-school exclusion rate (%)	Overall exclusion rate (%)	Percentage of ineligible / withdrawn	Coverage Index 1	Coverage Index 2	Coverage Index 3	Coverage Index 4	Coverage Index 5
OECD	Belgium (Flemish community)	159	79	780	0.25	1.71	1.24	0.98	0.98	0.89	0.97	0.97
	Spain (Andalusia)	1 718	21	817	2.06	2.36	0.98	0.98	0.98	0.92	1.01	1.00
	Spain (Aragon)	204	20	112	1.86	2.28	1.02	0.98	0.98	0.92	0.99	1.00
	Spain (Asturias)	84	8	27	1.21	1.58	0.39	0.98	0.98	0.93	0.99	0.99
	Spain (Balearic Islands)	177	9	40	1.89	2.50	0.43	0.98	0.98	0.87	0.99	0.99
	Spain (Basque Country)	254	20	67	1.44	1.76	0.38	0.98	0.98	0.94	0.98	1.00
	Spain (Canary Islands)	374	29	285	1.89	2.23	1.44	0.98	0.98	0.89	0.98	1.01
	Spain (Cantabria)	35	8	19	0.76	1.15	0.41	0.99	0.99	0.95	0.96	1.01
	Spain (Castile and Leon)	883	14	123	4.67	5.08	0.65	0.95	0.95	0.90	0.96	1.00
	Spain (CastileLaMancha)	333	22	213	1.70	2.28	1.09	0.98	0.98	0.91	1.00	1.00
	Spain (Catalonia)	3 011	18	578	4.55	5.41	0.87	0.95	0.95	0.89	0.98	1.00
	Spain (Extremadura)	201	18	92	1.96	2.54	0.89	0.97	0.97	0.92	0.97	0.99
	Spain (Galicia)	417	3	28	2.14	2.48	0.14	0.98	0.98	0.91	0.99	1.00
	Spain (La Rioja)	7	27	48	0.26	1.41	1.73	0.99	0.99	0.94	0.98	1.00
	Spain (Madrid)	529	11	270	0.98	1.69	0.50	0.98	0.98	0.91	1.01	0.99
	Spain (Murcia)	391	4	27	2.80	3.23	0.20	0.97	0.97	0.86	1.00	1.00
	Spain (Navarra)	138	18	48	2.45	2.90	0.86	0.97	0.97	0.89	0.97	0.99
	Spain (Valencia)	3 014	12	247	7.19	7.61	0.59	0.92	0.92	0.82	0.97	0.98
	United Kingdom (Scotland)	2 645	172	2 166	5.01	6.52	4.10	0.93	0.93	0.89	0.96	1.00
	United States (Massachusetts (public))	2 785	106	3 514	4.37	4.40	5.52	0.96	0.83	0.76	0.91	0.97
	United States (North Carolina (public))	4 636	107	5 517	4.26	4.62	5.07	0.95	0.90	0.80	0.98	1.01
	United States (Puerto Rico)[1]	440	235	8 761	1.43	3.11	28.54	0.97	0.97	0.60	0.78	0.90
Partners	Argentina (CABA)	85	48	714	0.26	0.30	2.21	1.00	1.00	1.04	0.91	0.99
	United Arab Emirates (Abu Dhabi)	36	53	265	0.19	1.23	1.44	0.99	0.99	0.93	0.95	1.00
	United Arab Emirates (Dubai)	104	69	215	0.80	4.72	1.65	0.95	0.95	0.88	0.93	1.00

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.

For calculating school response rates before replacement, the numerator consisted of all original sample schools with enrolled age-eligible students who participated (i.e., assessed a sample of PISA-eligible students, and obtained a student response rate of at least 50%). The denominator consisted of all the schools in the numerator, plus those original sample schools with enrolled age-eligible students that either did not participate or failed to assess at least 50% of PISA-eligible sample students. Schools that were included in the sampling frame, but were found to have no age-eligible students, or which were excluded in the field were omitted from the calculation of response rates. Replacement schools do not figure in these calculations.

Table 11.3 Response rates before school replacement

		Weighted school participation rate before replacement (%) (SCHRRW1)	Weighted number of responding schools (weighted also by enrollment) (NUMW1)	Weighted number of schools sampled (responding + non-responding) (weighted also by enrollment) (DENW1)	Unweighted school participation rate before replacement (%) (SCHRRU1)	Number of responding schools (unweighted) (NUMU1)	Number of responding and non-responding schools (unweighted) (DENU1)
OECD	Australia	94.42	260 657	276 072	91.37	720	788
	Austria	99.95	81 690	81 730	98.53	269	273
	Belgium	83.07	98 786	118 915	81.06	244	301
	Canada	74.48	283 853	381 133	69.74	703	1008
	Chile	92.43	215 139	232 756	89.22	207	232
	Czech Republic	98.13	86 354	87 999	98.55	339	344
	Denmark	90.46	57 803	63 897	88.14	327	371
	Estonia	99.89	11 142	11 154	99.52	206	207
	Finland	99.78	58 653	58 782	99.40	167	168
	France	90.75	679 984	749 284	90.98	232	255
	Germany	96.25	764 423	794 206	95.70	245	256
	Greece	92.23	95 030	103 031	89.62	190	212
	Hungary	93.42	83 897	89 808	92.03	231	251
	Iceland	98.82	4 114	4 163	94.57	122	129
	Ireland	99.29	61 023	61 461	98.82	167	169
	Israel	90.90	105 192	115 717	88.95	169	190
	Italy	74.39	383 933	516 113	77.82	414	532
	Japan	94.45	1 087 414	1 151 305	94.50	189	200
	Korea	99.65	612 937	615 107	99.41	168	169
	Latvia	86.46	14 122	16 334	85.87	231	269
	Luxembourg	100.00	5 891	5 891	100.00	44	44
	Mexico	95.46	1 311 608	1 373 919	94.72	269	284
	Netherlands	63.31	121 527	191 966	62.19	125	201
	New Zealand	71.43	40 623	56 875	69.05	145	210
	Norway	95.17	58 824	61 809	95.02	229	241
	Poland	88.49	314 288	355 158	88.82	151	170
	Portugal	85.87	87 756	102 193	83.86	213	254
	Slovak Republic	92.69	50 513	54 499	92.20	272	295
	Slovenia	97.69	16 886	17 286	95.13	332	349
	Spain	98.87	404 640	409 246	99.00	199	201
	Sweden	99.70	93 819	94 097	98.54	202	205
	Switzerland	93.16	75 482	81 026	91.38	212	232
	Turkey	96.88	1 057 318	1 091 317	89.74	175	195
	United Kingdom	83.65	591 757	707 415	84.62	506	598
	United States	66.67	2 601 386	3 902 089	66.67	142	213
Partners	Albania	99.75	43 809	43 919	99.57	229	230
	Algeria	96.13	341 463	355 216	95.78	159	166
	Argentina	88.74	508 448	572 941	89.08	212	238
	Brazil	93.19	2 509 198	2 692 686	90.66	806	889
	B-S-J-G (China)	87.66	1 259 845	1 437 201	92.54	248	268
	Bulgaria	99.61	56 265	56 483	99.44	179	180
	Colombia	98.64	664 664	673 817	97.07	364	375
	Costa Rica	99.12	66 485	67 073	99.03	204	206
	Croatia	99.78	34 575	34 652	98.77	160	162
	Cyprus[1]	96.76	8 830	9 126	92.42	122	132
	Dominican Republic	98.90	136 669	138 187	98.97	193	195
	FYROM	99.72	16 426	16 472	99.07	106	107
	Georgia	97.49	40 552	41 595	95.88	256	267
	Hong Kong (China)	75.11	45 603	60 716	75.16	115	153
	Indonesia	98.44	3 126 468	3 176 076	98.31	232	236
	Jordan	100.00	119 024	119 024	100.00	250	250
	Kazakhastan	100.00	202 701	202 701	100.00	232	232
	Kosovo	100.00	26 924	26 924	100.00	224	224
	Lebanon	66.59	40 542	60 882	67.53	208	308
	Lithuania	99.36	31 386	31 588	99.36	309	311
	Macao (China)	100.00	4 414	4 414	100.00	45	45
	Malaysia	51.39	229 340	446 237	63.91	147	230
	Malta	99.95	4 341	4 343	96.72	59	61
	Moldova	100.00	30 145	30 145	100.00	229	229
	Montenegro	99.85	7 301	7 312	98.46	64	65
	Peru	99.52	468 406	470 651	99.29	280	282
	Qatar	98.98	13 333	13 470	98.81	166	168
	Romania	99.36	171 553	172 652	99.45	181	182
	Russia	99.37	1 181 937	1 189 441	99.52	209	210
	Singapore	97.17	45 299	46 620	97.77	175	179
	Chinese Taipei	100.00	286 778	286 778	100.00	214	214
	Thailand	98.50	739 772	751 010	98.53	269	273
	Trinidad and Tobago	91.55	15 904	17 371	86.50	141	163
	Tunisia	99.17	121 751	122 767	98.18	162	165
	United Arab Emirates	98.50	49 310	50 060	99.16	473	477
	Uruguay	98.28	42 986	43 737	98.19	217	221
	Viet Nam	100.00	996 757	996 757	100.00	188	188

1. See note 1 under Table 11.1.

Table 11.4 Response rates before school replacement, by adjudicated regions

		Weighted school participation rate before replacement (%) (SCHRRW1)	Weighted number of responding schools (weighted also by enrollment) (NUMW1)	Weighted number of schools sampled (responding + non-responding) (weighted also by enrollment) (DENW1)	Unweighted school participation rate before replacement (%) (SCHRRU1)	Number of responding schools (unweighted) (NUMU1)	Number of responding and non-responding schools (unweighted) (DENU1)
OECD	Belgium (Flemish community)	75.87	49 542	65 298	74.19	138	186
	Spain (Andalusia)	98.15	80 669	82 193	98.15	53	54
	Spain (Aragon)	100.00	11 126	11 126	100.00	53	53
	Spain (Asturias)	100.00	7 066	7 066	100.00	54	54
	Spain (Balearic Islands)	100.00	9 502	9 502	100.00	54	54
	Spain (Basque Country)	100.00	18 113	18 113	100.00	119	119
	Spain (Canary Islands)	98.26	19 877	20 229	98.15	53	54
	Spain (Cantabria)	100.00	4 780	4 780	100.00	56	56
	Spain (Castile and Leon)	100.00	19 602	19 602	100.00	57	57
	Spain (CastileLaMancha)	100.00	19 543	19 543	100.00	55	55
	Spain (Catalonia)	100.00	67 606	67 606	100.00	52	52
	Spain (Extremadura)	100.00	10 592	10 592	100.00	53	53
	Spain (Galicia)	100.00	19 617	19 617	100.00	59	59
	Spain (La Rioja)	100.00	2 822	2 822	100.00	47	47
	Spain (Madrid)	97.99	52 068	53 137	98.04	50	51
	Spain (Murcia)	100.00	14 015	14 015	100.00	53	53
	Spain (Navarra)	100.00	5 793	5 793	100.00	52	52
	Spain (Valencia)	97.94	42 313	43 204	98.11	52	53
	United Kingdom (Scotland)	86.61	47 878	55 282	86.32	101	117
	United States (Massachusetts (public))	78.40	54 800	69 899	77.36	41	53
	United States (North Carolina (public))	100.00	110 786	110 786	100.00	54	54
	United States (Puerto Rico)[1]	100.00	39 453	39 453	100.00	47	47
Partners	Argentina (CABA)	94.73	33 701	35 576	94.92	56	59
	United Arab Emirates (Abu Dhabi)	96.14	18 653	19 402	96.55	112	116
	United Arab Emirates (Dubai)	100.00	14 057	14 057	100.00	214	214

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.

For calculating school response rates after replacement, the numerator consisted of all sampled schools (original plus replacement) with enrolled age-eligible students that participated (i.e., assessed a sample of PISA-eligible students and obtained a student response rate of at least 50%). The denominator consisted of all the schools in the numerator, plus those original sample schools that had age-eligible students enrolled, but that failed to assess at least 50% of PISA-eligible sample students and for which no replacement school participated. Schools that were included in the sampling frame, but were found to contain no age-eligible students, were omitted from the calculation of response rates. Replacement schools were included in rates only when they participated, and were replacing a refusing school that had age-eligible students.

In calculating weighted school response rates, each school received a weight equal to the product of its base weight (the reciprocal of its selection probability) and the number of age-eligible students enrolled in the school, as indicated on the school sampling frame.

With the use of probability proportional to size sampling, where there are no certainty or small schools, the product of the initial weight and the enrolment will be a constant, so in participating countries with few certainty school selections and no oversampling or undersampling of any explicit strata, weighted and unweighted rates are very similar. The weighted school response rate before replacement is given by the formula:

11.1

$$\textit{weighted school response rate before replacement} = \frac{\sum_{i \in Y} W_i E_i}{\sum_{i \in (YUN)} W_i E_i}$$

where Y denotes the set of responding original sample schools with age-eligible students, N denotes the set of eligible non-responding original sample schools, W_i denotes the base weight for school i, $W_i = 1/P_i$ where P_i denotes the school selection probability for school i, and E_i denotes the enrolment size of age-eligible students, as indicated on the sampling frame.

Table 11.5 Response rates after school replacement

		Weighted school participation rate after all replacement (%) (SCHRRW3)	Weighted number of responding schools (weighted also by enrollment) (NUMW3)	Weighted number of schools sampled (responding + non-responding) (weighted also by enrollment) (DENW3)	Unweighted school participation rate after all replacement (%) (SCHRRU3)	Number of responding schools (unweighted) (NUMU3)	Number of responding and non-responding schools (unweighted) (DENU3)
OECD	Australia	94.95	262 130	276 072	91.75	723	788
	Austria	99.95	81 690	81 730	98.53	269	273
	Belgium	95.37	113 435	118 936	95.02	286	301
	Canada	78.57	299 512	381 189	72.02	726	1008
	Chile	99.14	230 749	232 757	97.41	226	232
	Czech Republic	98.13	86 354	87 999	98.55	339	344
	Denmark	92.03	58 837	63 931	89.22	331	371
	Estonia	99.89	11 142	11 154	99.52	206	207
	Finland	100.00	58 800	58 800	100.00	168	168
	France	94.34	706 838	749 284	94.51	241	255
	Germany	98.94	785 813	794 206	98.83	253	256
	Greece	98.48	101 653	103 218	98.58	209	212
	Hungary	98.80	88 751	89 825	97.21	244	251
	Iceland	98.82	4 114	4 163	94.57	122	129
	Ireland	99.29	61 023	61 461	98.82	167	169
	Israel	92.96	107 570	115 717	91.05	173	190
	Italy	87.50	451 098	515 515	87.22	464	532
	Japan	98.99	1 139 734	1 151 305	99.00	198	200
	Korea	99.65	612 937	615 107	99.41	168	169
	Latvia	92.52	15 103	16 324	92.19	248	269
	Luxembourg	100.00	5 891	5 891	100.00	44	44
	Mexico	97.52	1 339 901	1 373 919	96.83	275	284
	Netherlands	93.21	178 929	191 966	91.54	184	201
	New Zealand	84.50	48 094	56 913	83.81	176	210
	Norway	95.17	58 824	61 809	95.02	229	241
	Poland	99.32	352 754	355 158	98.82	168	170
	Portugal	95.10	97 516	102 537	93.70	238	254
	Slovak Republic	98.80	53 908	54 562	97.63	288	295
	Slovenia	97.75	16 896	17 286	95.42	333	349
	Spain	100.00	409 246	409 246	100.00	201	201
	Sweden	99.70	93 819	94 097	98.54	202	205
	Switzerland	97.67	79 481	81 375	96.98	225	232
	Turkey	99.12	1 081 935	1 091 528	95.90	187	195
	United Kingdom	92.59	654 992	707 415	91.47	547	598
	United States	83.32	3 244 399	3 893 828	83.10	177	213
Partners	Albania	99.75	43 809	43 919	99.57	229	230
	Algeria	96.13	341 463	355 216	95.78	159	166
	Argentina	97.13	556 478	572 941	97.06	231	238
	Brazil	94.08	2 533 711	2 693 137	91.68	815	889
	B-S-J-G (China)	100.00	1 437 652	1 437 652	100.00	268	268
	Bulgaria	100.00	56 600	56 600	100.00	180	180
	Colombia	99.81	672 526	673 835	98.93	371	375
	Costa Rica	99.12	66 485	67 073	99.03	204	206
	Croatia	99.78	34 575	34 652	98.77	160	162
	Cyprus[1]	96.76	8 830	9 126	92.42	122	132
	Dominican Republic	98.90	136 669	138 187	98.97	193	195
	FYROM	99.72	16 426	16 472	99.07	106	107
	Georgia	98.83	41 081	41 566	98.13	262	267
	Hong Kong (China)	90.25	54 795	60 715	90.20	138	153
	Indonesia	100.00	3 176 076	3 176 076	100.00	236	236
	Jordan	100.00	119 024	119 024	100.00	250	250
	Kazakhastan	100.00	202 701	202 701	100.00	232	232
	Kosovo	100.00	26 924	26 924	100.00	224	224
	Lebanon	87.33	53 091	60 797	87.66	270	308
	Lithuania	99.86	31 543	31 588	99.68	310	311
	Macao (China)	100.00	4 414	4 414	100.00	45	45
	Malaysia	98.06	437 424	446 100	97.39	224	230
	Malta	99.95	4 341	4 343	96.72	59	61
	Moldova	100.00	30 145	30 145	100.00	229	229
	Montenegro	99.85	7 301	7 312	98.46	64	65
	Peru	99.79	469 662	470 651	99.65	281	282
	Qatar	98.98	13 333	13 470	98.81	166	168
	Romania	100.00	172 495	172 495	100.00	182	182
	Russia	99.37	1 181 937	1 189 441	99.52	209	210
	Singapore	97.71	45 553	46 620	98.32	176	179
	Chinese Taipei	100.00	286 778	286 778	100.00	214	214
	Thailand	100.00	751 010	751 010	100.00	273	273
	Trinidad and Tobago	91.55	15 904	17 371	86.50	141	163
	Tunisia	99.22	121 838	122 792	98.79	163	165
	United Arab Emirates	98.50	49 310	50 060	99.16	473	477
	Uruguay	99.33	43 442	43 737	99.10	219	221
	Viet Nam	100.00	996 757	996 757	100.00	188	188

1. See note 1 under Table 11.1.

Table 11.6 Response rates after school replacement, by adjudicated regions

		Weighted school participation rate after all replacement (%) (SCHRRW3)	Weighted number of responding schools (weighted also by enrollment) (NUMW3)	Weighted number of schools sampled (responding + non-responding) (weighted also by enrollment) (DENW3)	Unweighted school participation rate after all replacement (%) (SCHRRU3)	Number of responding schools (unweighted) (NUMU3)	Number of responding and non-responding schools (unweighted) (DENU3)
OECD	Belgium (Flemish community)	93.45	61 039.32	65 319.22	93.55	174	186
	Spain (Andalusia)	100.00	82 192.73	82 192.73	100.00	54	54
	Spain (Aragon)	100.00	11 125.90	11 125.90	100.00	53	53
	Spain (Asturias)	100.00	7 065.53	7 065.53	100.00	54	54
	Spain (Balearic Islands)	100.00	9 501.65	9 501.65	100.00	54	54
	Spain (Basque Country)	100.00	18 113.27	18 113.27	100.00	119	119
	Spain (Canary Islands)	98.26	19 877.44	20 229.40	98.15	53	54
	Spain (Cantabria)	100.00	4 779.92	4 779.92	100.00	56	56
	Spain (Castile and Leon)	100.00	19 601.83	19 601.83	100.00	57	57
	Spain (CastileLaMancha)	100.00	19 542.72	19 542.72	100.00	55	55
	Spain (Catalonia)	100.00	67 606.13	67 606.13	100.00	52	52
	Spain (Extremadura)	100.00	10 592.13	10 592.13	100.00	53	53
	Spain (Galicia)	100.00	19 616.86	19 616.86	100.00	59	59
	Spain (La Rioja)	100.00	2 822.00	2 822.00	100.00	47	47
	Spain (Madrid)	100.00	53 137.04	53 137.04	100.00	51	51
	Spain (Murcia)	100.00	14 015.27	14 015.27	100.00	53	53
	Spain (Navarra)	100.00	5 793.20	5 793.20	100.00	52	52
	Spain (Valencia)	97.94	42 313.15	43 203.77	98.11	52	53
	United Kingdom (Scotland)	92.68	51 235.75	55 282.20	92.31	108	117
	United States (Massachusetts (public))	91.85	64 205.61	69 899.08	90.57	48	53
	United States (North Carolina (public))	100.00	110 785.88	110 785.88	100.00	54	54
	United States (Puerto Rico)[1]	100.00	39 453.16	39 453.16	100.00	47	47
Partners	Argentina (CABA)	96.49	34 325.94	35 576.10	96.61	57	59
	United Arab Emirates (Abu Dhabi)	96.14	18 652.63	19 402.38	96.55	112	116
	United Arab Emirates (Dubai)	100.00	14 057.00	14 057.00	100.00	214	214

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.

The weighted school response rate, after replacement, is given by the formula:

11.2

$$\textit{weighted school response rate after replacement} = \frac{\sum_{i \in (YUR)} W_i E_i}{\sum_{i \in (YURUN)} W_i E_i}$$

where Y denotes the set of responding original sample schools, R denotes the set of responding replacement schools, for which the corresponding original sample school was eligible but was non-responding, N denotes the set of eligible refusing original sample schools, W_i denotes the base weight for school i, $W_i = 1/P_i$, where P_i denotes the school selection probability for school i, and for weighted rates, E_i denotes the enrolment size of age-eligible students, as indicated on the sampling frame.

For unweighted student response rates, the numerator is the number of students for whom assessment data were included in the results less those in schools with between 25 and 50% student participation. The denominator is the number of sampled students who were age-eligible, and not explicitly excluded as student exclusions.

For weighted student response rates, the same number of students appears in the numerator and denominator as for unweighted rates, but each student was weighted by its student base weight. This is given as the product of the school base weight – for the school in which the student was enrolled – and the reciprocal of the student selection probability within the school.

In countries with no oversampling of any explicit strata, weighted and unweighted student participation rates are very similar.

Overall response rates are calculated as the product of school and student response rates. Although overall weighted and unweighted rates can be calculated, there is little value in presenting overall unweighted rates. The weighted rates indicate the proportion of the student population represented by the sample prior to making the school and student non-response adjustments.

Table 11.7 Response rates, students within schools after school replacement

		Weighted student participation rate after second replacement (%) (STURRW3)	Number of students assessed (Weighted) (NUMSTW3)	Number of students sampled (assessed + absent) (weighted) DENSTW3)	Unweighted student participation rate after second replacement (%) (STURRU3)	Number of students assessed (unweighted) (NUMSTU3)	Number of students sampled (assessed + absent) (unweighted) (DENSTU3)
OECD	Australia	83.99	204 763	243 789	80.61	14 089	17 477
	Austria	86.59	63 660	73 521	71.01	7 007	9 868
	Belgium	90.63	99 760	110 075	90.88	9 635	10 602
	Canada	80.80	210 476	260 487	81.25	19 604	24 129
	Chile	93.31	189 206	202 774	93.67	7 039	7 515
	Czech Republic	88.77	73 386	82 672	88.85	6 835	7 693
	Denmark	89.08	49 732	55 830	87.35	7 149	8 184
	Estonia	93.22	10 088	10 822	93.21	5 587	5 994
	Finland	93.44	53 198	56 934	93.45	5 882	6 294
	France	88.21	611 563	693 336	88.16	5 980	6 783
	Germany	93.27	685 972	735 487	93.26	6 476	6 944
	Greece	94.32	89 588	94 986	94.40	5 511	5 838
	Hungary	92.30	77 212	83 657	92.49	5 643	6 101
	Iceland	86.11	3 365	3 908	86.11	3 365	3 908
	Ireland	88.60	51 947	58 630	88.62	5 741	6 478
	Israel	90.48	98 572	108 940	90.46	6 598	7 294
	Italy	87.67	377 011	430 041	89.38	11 477	12 841
	Japan	97.24	1 096 193	1 127 265	97.21	6 647	6 838
	Korea	98.56	559 121	567 284	98.53	5 581	5 664
	Latvia	90.42	12 799	14 155	90.26	4 845	5 368
	Luxembourg	95.65	5 299	5 540	95.65	5 299	5 540
	Mexico	95.43	1 290 435	1 352 237	95.34	7 568	7 938
	Netherlands	85.12	152 346	178 985	85.26	5 345	6 269
	New Zealand	80.31	36 860	45 897	80.28	4 453	5 547
	Norway	90.75	50 163	55 277	90.69	5 456	6 016
	Poland	87.54	300 617	343 405	87.43	4 466	5 108
	Portugal	82.02	75 391	91 916	82.23	7 180	8 732
	Slovak Republic	92.37	45 357	49 103	91.91	6 342	6 900
	Slovenia	91.77	15 072	16 424	91.40	6 406	7 009
	Spain	89.14	356 509	399 935	89.34	6 736	7 540
	Sweden	90.67	82 582	91 081	90.77	5 458	6 013
	Switzerland	92.45	74 465	80 544	92.59	5 838	6 305
	Turkey	95.19	874 609	918 816	94.91	5 895	6 211
	United Kingdom	89.02	517 426	581 252	87.58	14 120	16 123
	United States	89.76	2 629 707	2 929 771	89.59	5 712	6 376
Partners	Albania	93.53	38 174	40 814	93.84	5 213	5 555
	Algeria	92.47	274 121	296 434	92.59	5 494	5 934
	Argentina	90.36	345 508	382 352	89.95	6 311	7 016
	Brazil	87.32	1 996 574	2 286 505	85.73	22 791	26 586
	B-S-J-G (China)	96.69	1 287 710	1 331 794	97.46	9 841	10 097
	Bulgaria	94.87	50 931	53 685	95.00	5 928	6 240
	Colombia	94.52	535 682	566 734	93.39	11 777	12 611
	Costa Rica	92.46	47 494	51 369	92.38	6 846	7 411
	Croatia	91.35	37 275	40 803	91.42	5 809	6 354
	Cyprus*	94.03	8 016	8 526	93.35	5 561	5 957
	Dominican Republic	93.82	122 620	130 700	94.13	4 731	5 026
	FYROM	94.92	14 999	15 802	94.78	5 324	5 617
	Georgia	93.91	35 567	37 873	93.44	5 316	5 689
	Hong Kong (China)	93.08	48 222	51 806	93.25	5 359	5 747
	Indonesia	97.51	3 015 844	3 092 773	97.30	6 513	6 694
	Jordan	97.42	105 868	108 669	97.39	7 267	7 462
	Kazakhastan	97.29	187 683	192 921	97.29	7 841	8 059
	Kosovo	98.58	22 016	22 333	98.57	4 826	4 896
	Lebanon	94.52	36 052	38 143	94.95	4 546	4 788
	Lithuania	90.57	27 070	29 889	90.57	6 523	7 202
	Macao (China)	99.31	4 476	4 507	99.31	4 476	4 507
	Malaysia	96.66	393 785	407 396	97.21	8 843	9 097
	Malta	84.63	3 634	4 294	84.63	3 634	4 294
	Moldova	98.00	28 754	29 341	97.96	5 325	5 436
	Montenegro	93.79	6 346	6 766	93.74	5 665	6 043
	Peru	98.90	426 205	430 959	98.82	6 971	7 054
	Qatar	94.09	12 061	12 819	94.09	12 061	12 819
	Romania	99.21	162 918	164 216	99.31	4 876	4 910
	Russia	96.83	1 072 914	1 108 068	96.88	6 021	6 215
	Singapore	93.33	42 241	45 259	93.14	6 105	6 555
	Chinese Taipei	98.00	246 408	251 424	97.93	7 708	7 871
	Thailand	96.88	614 996	634 795	97.15	8 249	8 491
	Trinidad and Tobago	79.38	9 674	12 188	79.84	4 587	5 745
	Tunisia	86.40	97 337	112 665	86.48	5 340	6 175
	United Arab Emirates	94.62	43 774	46 263	94.36	14 167	15 014
	Uruguay	86.16	32 762	38 023	86.24	6 059	7 026
	Viet Nam	99.60	871 353	874 859	99.61	5 826	5 849

* See note 1 under Table 11.1.

Table 11.8 Response rates, students within schools after school replacement, by adjudicated regions

		Weighted student participation rate after second replacement (%) (STURRW3)	Number of students assessed (weighted) (NUMSTW3)	Number of students sampled (assessed + absent) (weighted) (DENSTW3)	Unweighted student participation rate after second replacement (%) (STURRU3)	Number of students assessed (Unweighted) (NUMSTU3)	Number of students sampled (assessed + absent) (unweighted) (DENSTU3)
OECD	Belgium (Flemish community)	91.54	54 082.90	59 081.47	91.53	5 674	6 199
	Spain (Andalusia)	87.64	71 549.56	81 642.36	87.80	1 813	2 065
	Spain (Aragon)	89.49	9 626.75	10 757.56	89.54	1 798	2 008
	Spain (Asturias)	89.63	6 179.65	6 894.55	89.72	1 790	1 995
	Spain (Balearic Islands)	88.84	8 179.56	9 207.58	88.92	1 797	2 021
	Spain (Basque Country)	91.07	15 868.19	17 424.20	90.48	3 612	3 992
	Spain (Canary Islands)	90.40	17 279.43	19 113.67	90.39	1 825	2 019
	Spain (Cantabria)	90.39	4 136.09	4 575.66	90.58	1 924	2 124
	Spain (Castile and Leon)	92.03	16 568.49	18 003.77	91.98	1 858	2 020
	Spain (CastileLaMancha)	90.24	17 368.92	19 247.29	90.30	1 889	2 092
	Spain (Catalonia)	90.66	57 218.40	63 112.16	90.72	1 769	1 950
	Spain (Extremadura)	89.90	9 038.97	10 054.22	89.91	1 809	2 012
	Spain (Galicia)	91.13	17 371.25	19 062.58	91.06	1 865	2 048
	Spain (La Rioja)	91.71	2 529.21	2 757.90	91.89	1 461	1 590
	Spain (Madrid)	89.77	47 792.04	53 239.55	90.00	1 808	2 009
	Spain (Murcia)	86.96	11 787.15	13 555.12	87.02	1 796	2 064
	Spain (Navarra)	94.02	5 166.61	5 495.51	94.17	1 874	1 990
	Spain (Valencia)	87.50	33 270.94	38 024.57	87.55	1 611	1 840
	United Kingdom (Scotland)	79.99	37 114.07	46 396.20	79.99	3 095	3 869
	United States (Massachusetts (public))	90.36	42 557.08	47 096.94	90.68	1 391	1 534
	United States (North Carolina (public))	92.43	96 277.78	104 161.17	92.59	1 887	2 038
	United States (Puerto Rico)[1]	93.12	28 179.19	30 261.01	93.64	1 398	1 493
Partners	Argentina (CABA)	90.34	28 282.38	31 306.97	89.33	1 649	1 846
	United Arab Emirates (Abu Dhabi)	93.40	16 483.27	17 647.64	93.09	3 610	3 878
	United Arab Emirates (Dubai)	94.34	12 174.95	12 905.86	94.16	6 287	6 677

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.

TEACHER RESPONSE RATES

Unweighted response rates for both science and non-science teachers were created using similar methods to those for unweighted student and school response rates – that is, ineligible teachers are not used in the denominator for the rate calculation.

These rates are presented in Table 11.9 for science teachers and in Table 11.10 for the non-science teachers.

In addition to these rates, unweighted response rates were calculated also for each sampled school in each country which implemented the Teacher Questionnaire. These rates were created as quality indicators for the questionnaire team who would use the Teacher Questionnaire data to create derived variables to help provide context about PISA students.

Table 11.9 Science teacher response rates

	Country	Science teacher unweighted response rate (%)	Science teacher numerator	Science teacher denominator	Number of ineligible science teachers
OECD	Australia	73.49	4 158	5 658	72
	Chile	90.07	771	856	110
	Czech Republic	94.88	2 169	2 286	18
	Germany	68.90	2 032	2 949	0
	Italy	74.50	2 422	3 251	23
	Korea	99.36	926	932	4
	Portugal	91.20	1 441	1 580	29
	Spain	95.53	1 368	1 432	33
	United States	87.20	1 110	1 273	12
	United States (Massachusetts (public))	90.49	390	431	9
	United States (North Carolina (public))	97.19	380	391	2
Partners	Brazil	70.35	2 650	3 767	0
	B-S-J-G (China)	99.30	2 410	2 427	29
	Colombia	85.42	1 324	1 550	57
	Dominican Republic	91.13	452	496	33
	Hong Kong (China)	91.48	1 042	1 139	4
	Macao (China)	98.99	391	395	2
	Malaysia	97.67	2 010	2 058	41
	Peru	95.65	902	943	33
	Chinese Taipei	98.98	1 545	1 561	9
	United Arab Emirates	89.13	1 795	2 014	10
	United Arab Emirates (Abu Dhabi)	87.83	729	830	7
	United Arab Emirates (Dubai)	90.34	1 103	1 221	7

Table 11.10 **Non-science teacher response rates**

	Country	Non-Science teacher unweighted response rate (%)	Non-Science teacher numerator	Non-Science teacher denominator	Number of ineligible non-science teachers
OECD	Australia	71.25	7 394	10 378	126
	Chile	90.68	2 295	2 531	100
	Czech Republic	93.75	3 750	4 000	55
	Germany	64.90	3 568	5 498	0
	Italy	70.45	4 526	6 424	52
	Korea	99.12	2 128	2 147	20
	Portugal	88.20	2 257	2 559	60
	Spain	92.46	2 526	2 732	89
	United States	88.53	2 099	2 371	24
	United States (Massachusetts (public))	89.36	630	705	10
	United States (North Carolina (public))	95.47	738	773	14
Partners	Brazil	67.01	5 398	8 055	0
	B-S-J-G (China)	99.03	3 880	3 918	49
	Colombia	82.89	3 295	3 975	90
	Dominican Republic	86.97	1 048	1 205	93
	Hong Kong (China)	89.80	1 841	2 050	5
	Macao (China)	99.34	2 410	2 426	4
	Malaysia	97.44	3 191	3 275	85
	Peru	99.32	2 918	2 938	123
	Chinese Taipei	99.08	3 130	3 159	17
	United Arab Emirates	87.23	3 285	3 766	30
	United Arab Emirates (Abu Dhabi)	87.29	1 222	1 400	11
	United Arab Emirates (Dubai)	88.78	2 026	2 282	25

DESIGN EFFECTS AND EFFECTIVE SAMPLE SIZES

Surveys in education and especially international surveys rarely sample students by simply selecting a random sample of students (known as a simple random sample, or SRS). Rather, a sampling design is used where schools are first selected and, within each selected school, classes or students are randomly sampled. Sometimes, geographic areas are first selected before sampling schools and students. This sampling design is usually referred to as a cluster sample or a multi-stage sample.

Selected students attending the same school cannot be considered as independent observations as assumed with a simple random sample because they are usually more similar to one another than to students attending other schools. For instance, the students are offered the same school resources, may have the same teachers and therefore are taught a common implemented curriculum, and so on. School differences are also larger if different educational programmes are not available in all schools. One expects to observe greater differences between a vocational school and an academic school than between two comprehensive schools.

Furthermore, it is well known that within a country, within sub-national entities and within a city, people tend to live in areas according to their financial resources. As children usually attend schools close to their home, it is likely that students attending the same school come from similar social and economic backgrounds.

A simple random sample of 4 000 students is thus likely to cover the diversity of the population better than a sample of 100 schools with 40 students observed within each school. It follows that the uncertainty associated with any population parameter estimate (i.e., standard error) will be larger for a clustered sample estimate than for a simple random sample estimate of the same size.

In the case of a simple random sample, the standard error of a mean estimate is equal to:

11.3

$$\sigma_{(\hat{\mu})} = \sqrt{\frac{\sigma^2}{n}}$$

where σ^2 denotes the variance of the whole student population and n is the student sample size.

For an infinite population of schools and infinite populations of students within schools, the standard error of a mean estimate from a cluster sample is equal to:

11.4

$$\sigma_{(\bar{x})} = \sqrt{\frac{\sigma^2_{schools}}{n_{schools}} + \frac{\sigma^2_{within}}{n_{schools} n_{students}}}$$

where $\sigma^2_{schools}$ denotes the variance of the school means, σ^2_{within} denotes the variances of students within schools, $n_{schools}$ denotes the sample size of schools, and $n_{students}$ denotes the sample size of students within each school.

The standard error for the mean from a simple random sample is inversely proportional to the square root of the number of selected students. The standard error for the mean from a cluster sample is proportional to the variance that lies between clusters (i.e. schools) and within clusters and inversely proportional to the square root of the number of selected schools and is also a function of the number of students selected per school.

It is usual to express the decomposition of the total variance into the between-school variance and the within-school variance by the coefficient of intraclass correlation, also denoted *Rho*. Mathematically, this index is equal to:

11.5

$$Rho = \frac{\sigma^2_{schools}}{\sigma^2_{schools} + \sigma^2_{within}}$$

This index provides an indication of the percentage of variance that lies between schools. A low intraclass correlation indicates that schools are performing similarly while higher values point towards large differences between school performance.

To limit the reduction of precision in the population parameter estimate, multi-stage sample designs usually use supplementary information to improve coverage of the population diversity. In PISA the following techniques were implemented to limit the increase in the standard error: (i) explicit and implicit stratification of the school sampling frame and (ii) selection of schools with probabilities proportional to their size. Complementary information generally cannot compensate totally for the increase in the standard error due to the multi-stage design however but will greatly reduce it.

Table 11.11 provides the standard errors on the PISA 2015 main domain scales, calculated as if the participating country sample was selected according to (i) a simple random sample; (ii) a multi-stage procedure without using complementary information (unstratified multi-stage sampling, with sampling weights ignored) and (iii) the unbiased BRR estimate for the actual PISA 2015 design, using Fay's method. It should be mentioned that the plausible value imputation variance was not included in these computations, which thus only reflect sampling error.

Note that the values in Table 11.11 for the standard errors for the unstratified multi-stage design are overestimates for countries that had a school census (Cyprus[1], Iceland, Luxembourg, Macao (China), Malta, Trinidad and Tobago, and Qatar) since these standard error estimates assume a sample of schools was collected.

Also note that in some of the countries where the BRR estimates in Table 11.11 are greater than the values for the unstratified multi-stage sample, this is because of regional or other oversampling (The countries with oversampling were: Argentina, Australia, Belgium, Brazil, B-S-J-G (China), Canada, Colombia, the Czech Republic, Denmark, Italy, Malaysia, Portugal, the United Arab Emirates, the United Kingdom).

The BRR estimates in Table 11.11 are also greater than the values for the unstratified multi-stage sample for almost all countries since nearly every country undersamples very small schools. As described in the sampling design chapter, some countries have a substantial proportion of students attending schools that have fewer students than the target cluster size (TCS). When small school undersampling was done, very small schools were undersampled while all other schools were slightly oversampled in compensation. In such cases, very small schools with at most 0, 1, or 2 age-eligible PISA students expected to be enrolled were typically undersampled by a factor of 4 while the very small schools with between 3 and TCS/2 age-eligible PISA students expected to be enrolled were undersampled by a factor of 2. This takes the allocation of schools to strata slightly away from proportional allocation, which can add slightly to weight variability and therefore to sampling variance. This is done though, to help countries minimise the operational burden of having too many small schools in their sample.

For the other instances of countries in Table 11.11 that have BRR estimates that are somewhat greater than estimates based on an unstratified multi-stage design it is unclear why the BRR variance should be larger, though it is possible that the stratification undertaken possibly did not explain enough between-school variance in these countries.

1. See note 1 under Table 11.1.

It is usual to express the effect of the sampling design on the standard errors by a statistic referred to as the design effect. This corresponds to the ratio of the variance of the estimate obtained from the (more complex) sample to the variance of the estimate that would be obtained from a simple random sample of the same number of sampling units. The design effect has two primary uses – in sample size estimation and in appraising the efficiency of more complex sampling plans (Cochran, 1977).

In PISA, as sampling variance has to be estimated by using the 80 *BRR* replicates, a design effect can be computed for a statistic *t* using:

11.6

$$Deff(t) = \frac{Var_{BRR}(t)}{Var_{SRS}(t)}$$

where $Var_{BRR}(t)$ is the sampling variance for the statistic *t* computed by the *BRR* replication method, and $Var_{SRS}(t)$ is the sampling variance for the same statistic *t* on the same data but considering the sample as a simple random sample.

Based on Table 11.11, the unbiased BRR standard error on the mean estimate in science in Australia (for example) is equal to 1.46 (rounded from *1.45568*). As the standard deviation of the science performance is equal to *102.29735*, the design effect in Australia for the mean estimate in science is therefore equal to:

11.7

$$Deff(t) = \frac{Var_{BRR}(t)}{Var_{SRS}(t)} = \frac{(1.45568)^2}{\left[102.29735^2/14\ 530\right]} = 2.942195$$

The sampling variance on the science performance mean in Australia is about *2.94* times larger than it would have been with a simple random sample of the same sample size. Note that the participating students are 14 530 as this number were assessed for science.

Another way to express the reduction of precision due to the complex sampling design is through the effective sample size, which expresses the simple random sample size that would give the same sampling variance as the one obtained from the actual complex sample design. The effective sample size for a statistic *t* is equal to:

11.8

$$Effn(t) = \frac{n}{Deff(t)} = \frac{n \times Var_{SRS}(t)}{Var_{BRR}(t)}$$

where *n* is equal to the actual number of units in the sample. The effective sample size in Australia for the science performance mean is equal to:

11.9

$$Effn(t) = \frac{n}{Deff(t)} = \frac{14\ 530}{2.942195} = 4938.4898$$

In other words, a simple random sample of *4 938* students in Australia would have been as precise as the actual PISA 2015 sample for the national estimate of mean science proficiency.

VARIABILITY OF THE DESIGN EFFECT

Neither the design effect nor the effective sample size is a definitive characteristic of a sample. Both the design effect and the effective sample size vary with the variable and statistic of interest.

As previously stated, the sampling variance for estimates of the mean from a cluster sample is proportional to the intraclass correlation. In some countries, student performance varies between schools. Students in academic schools usually tend to perform well while on average student performance in vocational schools is lower. Let us now suppose that the height of the students was also measured, and there are no reasons why students in academic schools should be of different height than students in vocational schools. For this particular variable, the expected value of the between-school variance should be equal to zero and therefore, the design effect should tend to one. As the segregation effect differs according to the variable, the design effect will also differ according to the variable.

The second factor that influences the size of the design effect is the choice of requested statistics. It tends to be large for means, proportions, and sums but substantially smaller for bivariate or multivariate statistics such as correlation and regression coefficients.

Design effects in PISA for performance variables

The notion of design effect as given earlier is extended and gives rise to five different design effect formulae to describe the influence of the sampling and test designs on the standard errors for statistics.

The total errors computed for the international PISA initial reports (OECD, 2016a,b) that involves performance variables (scale scores) consist of two components: sampling variance and measurement variance. The standard error of proficiency estimates in PISA is inflated because the students were not sampled according to a simple random sample and also because the estimation of student proficiency includes some amount of measurement error.

For any statistic *r*, the population estimate and the sampling variance are computed for each plausible value and then combined as described in Chapter 9.

The five design effects and their respective effective sample sizes are defined as follows:

- Design Effect 1

11.10

$$Deff_1(r) = \frac{Var_{SRS}(r) + MVar(r)}{Var_{SRS}(r)}$$

where *MVar(r)* is the measurement variance for the statistic *r*. This design effect shows the inflation of the total variance that would have occurred due to measurement error if in fact the samples were considered as a simple random sample.

- Design Effect 2

11.11

$$Deff_2(r) = \frac{Var_{BRR}(r) + MVar(r)}{Var_{SRS}(r) + MVar(r)}$$

shows the inflation of the *total* variance due only to the use of a complex sampling design.

- Design Effect 3

11.12

$$Deff_3(r) = \frac{Var_{BRR}(r)}{Var_{SRS}(r)}$$

shows the inflation of the sampling variance due to the use of a complex design.

- Design Effect 4

11.13

$$Deff_4(r) = \frac{Var_{BRR}(r) + MVar(r)}{Var_{BRR}(r)}$$

shows the inflation of the total variance due to measurement variance.

- Design Effect 5

11.14

$$Deff_5(r) = \frac{Var_{BRR}(r) + MVar(r)}{Var_{SRS}(r)}$$

shows the inflation of the total variance due to the measurement variance and due to the complex sampling design.

The product of the first and second design effects equals the product of the third and fourth design effects, and both products are equal to the fifth design effect.

Tables 11.12 through 11.16 present the values of the different design effects and the corresponding effective sample sizes for each of the major domains.

Table 11.11 Standard errors for the PISA 2015 main domain scales

	Country	Collaborative problem solving		Financial literacy		Mathematical literacy		Reading literacy		Science literacy	
		Simple random sample	Unbiased BRR	Simple random sample	Unbiased BRR	Simple random sample	Unbiased BRR	Simple random sample	Unbiased BRR	Simple random sample	Unbiased BRR
OECD	Australia	0.88	1.52	0.98	1.84	0.77	1.33	0.85	1.36	0.85	1.46
	Austria	1.18	2.34			1.14	2.68	1.21	2.57	1.16	2.40
	Belgium	1.00	2.24	1.41	2.61	0.99	2.27	1.02	2.34	1.02	2.27
	Canada	0.74	2.08	0.93	3.65	0.62	2.14	0.66	2.15	0.65	2.06
	Chile	1.00	2.28	1.20	2.97	1.02	2.36	1.05	2.51	1.02	2.33
	Czech Republic	1.10	1.99			1.09	2.23	1.21	2.48	1.15	2.25
	Denmark	1.07	2.34			0.95	2.01	1.03	2.41	1.07	2.35
	Estonia	1.21	2.02			1.08	1.78	1.17	2.01	1.19	1.96
	Finland	1.32	2.30			1.07	2.03	1.22	2.51	1.25	2.36
	France	1.28	1.93			1.22	1.98	1.43	2.36	1.30	2.03
	Germany	1.25	2.48			1.10	2.45	1.24	2.89	1.23	2.63
	Greece	1.24	3.47			1.20	3.56	1.32	4.27	1.24	3.89
	Hungary	1.27	2.25			1.25	2.35	1.29	2.49	1.28	2.38
	Iceland	1.63	1.72			1.60	1.68	1.71	1.80	1.57	1.66
	Ireland					1.05	2.00	1.14	2.27	1.17	2.29
	Israel	1.36	3.52			1.27	3.41	1.39	3.73	1.31	3.42
	Italy	0.89	2.42	0.85	2.42	0.87	2.63	0.87	2.43	0.85	2.46
	Japan	1.04	2.55			1.08	2.77	1.13	3.11	1.15	2.94
	Korea	1.12	2.23			1.33	3.49	1.30	3.25	1.27	3.09
	Latvia	1.29	1.74			1.11	1.54	1.21	1.64	1.18	1.46
	Luxembourg	1.37	1.07			1.29	0.82	1.46	0.96	1.38	0.86
	Mexico	0.91	2.21			0.86	2.21	0.90	2.37	0.82	2.06
	Netherlands	1.32	2.24	1.53	2.51	1.25	2.08	1.38	2.22	1.38	2.22
	New Zealand	1.57	2.19			1.37	2.11	1.56	2.26	1.55	2.35
	Norway	1.27	2.22			1.15	2.05	1.34	2.34	1.30	2.23
	Poland			1.48	2.70	1.31	2.31	1.34	2.26	1.36	2.48
	Portugal	1.07	2.38			1.12	2.41	1.07	2.47	1.07	2.35
	Puerto Rico (United States)[1]					2.06	5.35	2.56	6.94	2.31	6.00
	Slovak Republic	1.17	2.27	1.44	3.38	1.20	2.47	1.31	2.71	1.24	2.56
	Slovenia	1.16	1.34			1.10	1.14	1.15	1.16	1.19	1.23
	Spain	1.07	1.96	1.21	2.74	1.03	2.02	1.06	2.18	1.07	2.05
	Sweden	1.33	3.22			1.22	3.06	1.38	3.40	1.39	3.53
	Switzerland					1.25	2.80	1.28	2.89	1.30	2.86
	Turkey	1.02	3.38			1.07	4.08	1.07	3.91	1.03	3.88
	United Kingdom	0.87	2.47			0.78	2.42	0.81	2.51	0.84	2.47
	United States	1.43	3.44	1.35	3.49	1.17	3.07	1.32	3.32	1.30	3.13
Partners	Albania					1.19	3.37	1.34	4.00	1.09	3.20
	Algeria					0.96	2.83	0.98	2.84	0.93	2.56
	Argentina					1.01	3.00	1.11	3.17	1.01	2.75
	Brazil	0.58	2.11	0.72	3.17	0.59	2.55	0.66	2.44	0.59	2.27
	B-S-J-G (China)	0.98	3.90	1.18	5.40	1.07	4.74	1.10	5.08	1.04	4.62
	Bulgaria	1.27	3.79			1.26	3.88	1.49	4.87	1.32	4.34
	Colombia	0.76	2.27			0.71	2.15	0.83	2.79	0.74	2.31
	Costa Rica	0.94	2.17			0.83	2.12	0.96	2.57	0.85	2.04
	Croatia	1.14	2.36			1.16	2.56	1.19	2.59	1.17	2.42
	Cyprus[2]	1.22	1.25			1.24	1.13	1.37	1.32	1.24	1.22
	Dominican Republic					1.00	2.29	1.23	2.94	1.05	2.45
	FYROM					1.31	1.16	1.36	1.17	1.16	1.08
	Georgia					1.29	2.61	1.42	2.76	1.24	2.36
	Hong Kong (China)	1.24	2.75			1.23	2.87	1.17	2.59	1.10	2.43
	Indonesia					0.99	2.91	0.94	2.72	0.85	2.49
	Jordan					1.01	2.45	1.10	2.71	0.99	2.62
	Kazakhstan					0.93	3.90	0.91	3.11	0.86	3.61
	Kosovo					1.08	1.47	1.13	1.42	1.03	1.37
	Lebanon					1.50	3.57	1.71	4.22	1.34	3.31
	Lithuania	1.12	2.31	1.19	2.77	1.07	2.23	1.17	2.68	1.13	2.57
	Macao (China)	1.34	0.96			1.19	0.89	1.23	0.87	1.22	0.90
	Malaysia	0.85	3.22			0.85	3.11	0.86	3.37	0.80	2.95
	Malta					1.83	1.43	2.00	1.54	1.95	1.45
	Moldova					1.24	2.25	1.34	2.41	1.18	1.90
	Montenegro	1.05	0.94			1.15	1.02	1.25	1.10	1.13	0.98
	Peru	1.00	2.38	1.23	3.07	0.99	2.43	1.07	2.76	0.92	2.30
	Qatar					0.90	0.67	1.01	0.77	0.90	0.71
	Romania					1.24	3.70	1.36	3.99	1.13	3.21
	Russia	1.19	3.28	1.11	3.07	1.07	2.99	1.13	2.94	1.06	2.90
	Singapore	1.24	1.07			1.22	1.15	1.26	1.23	1.32	1.11
	Chinese Taipei	1.03	2.29			1.17	2.68	1.06	2.42	1.13	2.62
	Thailand	0.92	3.35			0.90	2.94	0.88	3.21	0.86	2.79
	Trinidad and Tobago					1.40	1.05	1.52	1.24	1.37	1.12
	Tunisia	0.80	1.84			1.15	2.84	1.11	2.61	0.88	2.01
	United Arab Emirates	0.80	2.28			0.81	2.20	0.89	2.67	0.83	2.40
	Uruguay	1.17	2.17			1.11	2.16	1.24	2.42	1.11	2.17
	Viet Nam					1.10	4.38	0.95	3.67	1.00	3.86

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.
2. See note 1 under Table 11.1.

Table 11.12 Design effects and effective sample sizes for scientific literacy

	Country	Design effect 1	Design Efect 2	Design effect 3	Design effect 4	Design effect 5	Sample size 1	Sample size 2	Sample size 3	Sample size 4	Sample size 5
OECD	Australia	1.33	2.46	2.94	1.11	3.27	10 919	5 908	4 939	13 062	4 440
	Austria	1.14	3.87	4.26	1.03	4.40	6 171	1 808	1 643	6 791	1 592
	Belgium	1.09	4.60	4.95	1.02	5.04	8 814	2 097	1 951	9 469	1 915
	Canada	1.16	8.79	10.02	1.02	10.17	17 328	2 282	2 003	19 747	1 972
	Chile	1.22	4.43	5.18	1.04	5.40	5 794	1 591	1 362	6 769	1 307
	Czech Republic	1.06	3.69	3.85	1.01	3.91	6 520	1 866	1 791	6 793	1 765
	Denmark	1.11	4.46	4.84	1.02	4.96	6 442	1 606	1 478	7 000	1 445
	Estonia	1.38	2.24	2.72	1.14	3.10	4 043	2 489	2 054	4 899	1 801
	Finland	1.11	3.28	3.53	1.03	3.64	5 308	1 791	1 666	5 707	1 616
	France	1.08	2.30	2.41	1.04	2.49	5 631	2 656	2 534	5 901	2 448
	Germany	1.23	3.92	4.58	1.05	4.80	5 321	1 665	1 425	6 215	1 358
	Greece	1.15	8.70	9.89	1.02	10.05	4 793	636	559	5 447	551
	Hungary	1.12	3.20	3.46	1.03	3.57	5 064	1 769	1 637	5 472	1 583
	Iceland	1.03	1.11	1.11	1.03	1.14	3 266	3 039	3 029	3 276	2 944
	Ireland	1.32	3.14	3.82	1.08	4.14	4 354	1 830	1 504	5 299	1 388
	Israel	1.07	6.42	6.82	1.01	6.89	6 147	1 028	968	6 528	957
	Italy	1.39	6.33	8.38	1.05	8.77	8 359	1 830	1 382	11 074	1 321
	Japan	1.11	6.03	6.58	1.02	6.69	5 989	1 102	1 010	6 538	993
	Korea	1.15	5.23	5.89	1.03	6.04	4 835	1 066	948	5 438	924
	Latvia	1.22	1.44	1.53	1.14	1.75	3 987	3 390	3 177	4 255	2 776
	Luxembourg	1.27	0.52	0.39	1.71	0.66	4 157	10 227	13 738	3 094	8 022
	Mexico	1.44	4.69	6.30	1.07	6.74	5 266	1 614	1 201	7 077	1 123
	Netherlands	1.10	2.46	2.60	1.04	2.69	4 918	2 190	2 073	5 195	2 000
	New Zealand	1.07	2.21	2.30	1.03	2.37	4 206	2 048	1 968	4 378	1 906
	Norway	1.08	2.78	2.93	1.03	3.01	5 037	1 960	1 861	5 306	1 810
	Poland	1.09	3.15	3.33	1.03	3.42	4 125	1 423	1 345	4 366	1 311
	Portugal	1.33	3.87	4.81	1.07	5.13	5 522	1 893	1 524	6 859	1 427
	Puerto Rico (United States)[1]	1.19	5.86	6.78	1.03	6.97	1 175	239	206	1 360	201
	Slovak Republic	1.10	3.98	4.27	1.02	4.36	5 791	1 595	1 488	6 209	1 455
	Slovenia	1.16	1.07	1.08	1.15	1.24	5 503	6 014	5 954	5 558	5 166
	Spain	1.05	3.53	3.66	1.01	3.71	6 418	1 906	1 840	6 646	1 816
	Sweden	1.27	5.30	6.47	1.04	6.74	4 295	1 029	844	5 239	810
	Switzerland	1.15	4.33	4.83	1.03	4.98	5 097	1 354	1 214	5 684	1 178
	Turkey	1.42	10.23	14.10	1.03	14.52	4 152	576	418	5 725	406
	United Kingdom	1.67	5.62	8.71	1.08	9.37	8 484	2 520	1 626	13 147	1 510
	United States	1.18	5.03	5.76	1.03	5.94	4 835	1 135	991	5 538	961
Partners	Albania	1.44	6.33	8.66	1.05	9.10	3 628	824	602	4 964	573
	Algeria	1.48	5.44	7.55	1.06	8.03	3 740	1 014	731	5 192	687
	Argentina	1.65	4.86	7.37	1.09	8.02	3 847	1 306	861	5 834	791
	Brazil	1.40	10.97	14.96	1.03	15.36	16 522	2 110	1 547	22 537	1 507
	B-S-J-G (China)	1.14	17.42	19.66	1.01	19.79	8 661	565	501	9 773	497
	Bulgaria	1.06	10.27	10.82	1.01	10.88	5 596	577	548	5 896	545
	Colombia	1.40	7.29	9.78	1.04	10.18	8 443	1 619	1 206	11 335	1 159
	Costa Rica	1.21	5.00	5.82	1.04	6.03	5 697	1 373	1 179	6 632	1 139
	Croatia	1.12	3.92	4.26	1.03	4.38	5 207	1 480	1 363	5 655	1 327
	Cyprus[2]	1.27	0.97	0.96	1.28	1.23	4 387	5 753	5 804	4 348	4 530
	Dominican Republic	1.59	3.77	5.41	1.11	6.00	2 977	1 258	877	4 272	790
	FYROM	1.30	0.89	0.86	1.35	1.15	4 105	5 981	6 208	3 954	4 611
	Georgia	1.17	3.24	3.62	1.05	3.78	4 553	1 640	1 470	5 081	1 405
	Hong Kong	1.50	3.57	4.85	1.10	5.36	3 569	1 502	1 104	4 857	1 001
	Indonesia	1.56	5.88	8.61	1.06	9.17	4 178	1 107	756	6 116	710
	Jordan	1.28	5.72	7.02	1.04	7.30	5 691	1 271	1 035	6 991	996
	Kazakhstan	1.63	11.10	17.47	1.04	18.10	4 810	706	449	7 568	433
	Kosovo	1.97	1.40	1.78	1.54	2.74	2 455	3 459	2 716	3 126	1 759
	Lebanon	1.32	4.86	6.09	1.05	6.41	3 447	935	746	4 320	709
	Lithuania	1.32	4.20	5.23	1.06	5.55	4 938	1 552	1 247	6 147	1 175
	Macao	1.21	0.63	0.55	1.39	0.77	3 689	7 091	8 101	3 229	5 845
	Malaysia	1.51	9.22	13.43	1.04	13.94	5 860	961	660	8 535	636
	Malta	1.16	0.61	0.55	1.29	0.71	3 140	5 941	6 599	2 827	5 133
	Moldova	1.21	2.31	2.59	1.08	2.80	4 388	2 309	2 060	4 919	1 902
	Montenegro	1.08	0.77	0.75	1.10	0.83	5 255	7 397	7 578	5 129	6 861
	Peru	1.31	5.04	6.28	1.05	6.59	5 326	1 384	1 109	6 644	1 057
	Qatar	1.63	0.77	0.62	2.02	1.25	7 409	15 755	19 491	5 989	9 660
	Romania	1.13	7.22	8.02	1.02	8.15	4 324	675	608	4 800	599
	Russia	1.08	7.02	7.47	1.01	7.55	5 612	860	808	5 976	799
	Singapore	1.12	0.73	0.70	1.17	0.81	5 476	8 379	8 757	5 240	7 504
	Chinese Taipei	1.28	4.40	5.35	1.05	5.63	6 015	1 753	1 440	7 323	1 368
	Thailand	1.36	7.90	10.39	1.03	10.75	6 066	1 044	794	7 973	768
	Trinidad and Tobago	1.39	0.76	0.67	1.59	1.06	3 371	6 167	7 034	2 955	4 430
	Tunisia	1.51	3.75	5.15	1.10	5.66	3 558	1 435	1 044	4 890	950
	United Arab Emirates	1.18	7.17	8.28	1.02	8.46	12 010	1 975	1 711	13 866	1 675
	Uruguay	1.12	3.52	3.81	1.03	3.92	5 436	1 724	1 593	5 884	1 546
	Viet Nam	1.39	10.93	14.79	1.03	15.18	4 195	533	394	5 677	384

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.
2. See note 1 under Table 11.1.

Table 11.13 Design effects and effective sample sizes for mathematical literacy

	Country	Design effect 1	Design Efect 2	Design effect 3	Design effect 4	Design effect 5	Sample size 1	Sample size 2	Sample size 3	Sample size 4	Sample size 5
OECD	Australia	2.36	1.83	2.96	1.46	4.32	6 157	7 931	4 902	9 960	3 360
	Austria	1.77	3.58	5.57	1.14	6.34	3 958	1 958	1 259	6 155	1 106
	Belgium	1.38	4.07	5.24	1.07	5.62	6 986	2 370	1 841	8 997	1 716
	Canada	2.99	4.66	11.95	1.17	13.94	6 709	4 302	1 678	17 195	1 439
	Chile	1.85	3.37	5.38	1.16	6.23	3 818	2 091	1 310	6 094	1 132
	Czech Republic	1.63	2.96	4.18	1.15	4.81	4 235	2 332	1 648	5 994	1 433
	Denmark	1.76	2.96	4.45	1.17	5.21	4 064	2 420	1 608	6 115	1 373
	Estonia	1.86	1.93	2.74	1.32	3.60	2 997	2 890	2 039	4 248	1 550
	Finland	2.04	2.28	3.61	1.29	4.65	2 882	2 583	1 631	4 565	1 266
	France	1.33	2.23	2.64	1.13	2.97	4 578	2 743	2 316	5 421	2 056
	Germany	2.90	2.37	4.97	1.38	6.87	2 249	2 754	1 313	4 717	950
	Greece	1.96	4.97	8.79	1.11	9.76	2 818	1 113	629	4 986	567
	Hungary	1.55	2.65	3.56	1.15	4.11	3 651	2 135	1 591	4 901	1 378
	Iceland	1.44	1.07	1.10	1.40	1.54	2 336	3 150	3 061	2 404	2 183
	Ireland	1.21	3.14	3.59	1.06	3.80	4 736	1 830	1 599	5 421	1 510
	Israel	1.93	4.21	7.20	1.13	8.13	3 415	1 567	916	5 842	811
	Italy	2.53	4.23	9.18	1.17	10.71	4 570	2 741	1 262	9 923	1 081
	Japan	2.13	3.61	6.56	1.17	7.69	3 124	1 840	1 014	5 672	865
	Korea	1.91	4.05	6.82	1.13	7.73	2 919	1 380	818	4 923	722
	Latvia	1.92	1.48	1.91	1.48	2.83	2 541	3 299	2 547	3 291	1 722
	Luxembourg	1.56	0.62	0.41	2.38	0.97	3 389	8 515	12 943	2 229	5 445
	Mexico	1.19	5.65	6.56	1.03	6.75	6 336	1 338	1 154	7 350	1 121
	Netherlands	1.36	2.31	2.79	1.13	3.14	3 965	2 326	1 933	4 771	1 713
	New Zealand	1.36	2.01	2.37	1.15	2.73	3 323	2 249	1 904	3 925	1 653
	Norway	1.58	2.39	3.19	1.18	3.77	3 455	2 286	1 710	4 617	1 447
	Poland	1.23	2.70	3.10	1.07	3.33	3 635	1 657	1 446	4 166	1 345
	Portugal	1.30	3.81	4.65	1.07	4.96	5 623	1 925	1 574	6 878	1 478
	Puerto Rico (United States)[1]	1.52	4.80	6.78	1.08	7.30	919	291	206	1 298	192
	Slovak Republic	1.69	2.92	4.24	1.16	4.93	3 760	2 176	1 498	5 462	1 289
	Slovenia	1.23	1.06	1.08	1.22	1.31	5 193	6 031	5 949	5 264	4 888
	Spain	1.52	2.86	3.83	1.14	4.34	4 438	2 354	1 761	5 933	1 551
	Sweden	1.48	4.58	6.29	1.08	6.77	3 696	1 191	867	5 074	806
	Switzerland	1.43	3.82	5.03	1.08	5.45	4 109	1 533	1 166	5 402	1 075
	Turkey	1.36	10.99	14.61	1.02	14.97	4 328	536	403	5 752	394
	United Kingdom	1.58	6.50	9.71	1.06	10.30	8 939	2 177	1 457	13 355	1 375
	United States	1.45	5.06	6.87	1.07	7.32	3 948	1 129	831	5 363	781
Partners	Albania	1.38	6.05	7.96	1.05	8.34	3 786	862	655	4 979	626
	Algeria	1.79	5.32	8.72	1.09	9.50	3 088	1 038	633	5 062	581
	Argentina	1.33	6.84	8.78	1.04	9.11	4 766	928	723	6 118	697
	Brazil	5.96	4.01	18.90	1.26	23.86	3 885	5 778	1 224	18 333	970
	B-S-J-G (China)	2.20	9.48	19.70	1.06	20.90	4 464	1 038	500	9 274	471
	Bulgaria	1.37	7.16	9.45	1.04	9.82	4 326	828	628	5 704	604
	Colombia	2.20	4.70	9.15	1.13	10.35	5 359	2 508	1 289	10 426	1 140
	Costa Rica	3.30	2.70	6.61	1.35	8.91	2 081	2 543	1 039	5 093	771
	Croatia	1.84	3.10	4.88	1.17	5.72	3 151	1 872	1 191	4 953	1 015
	Cyprus[2]	2.10	0.92	0.83	2.33	1.93	2 654	6 068	6 727	2 394	2 891
	Dominican Republic	2.97	2.45	5.31	1.37	7.28	1 595	1 936	893	3 456	651
	FYROM	1.18	0.81	0.78	1.23	0.95	4 526	6 576	6 861	4 339	5 591
	Georgia	1.56	3.00	4.11	1.14	4.67	3 418	1 772	1 293	4 683	1 139
	Hong Kong	1.44	4.06	5.42	1.08	5.86	3 719	1 319	990	4 955	915
	Indonesia	2.08	4.67	8.64	1.13	9.72	3 128	1 395	754	5 788	670
	Jordan	2.01	3.45	5.93	1.17	6.93	3 617	2 105	1 226	6 210	1 048
	Kazakhstan	4.52	4.67	17.60	1.20	21.13	1 733	1 679	445	6 533	371
	Kosovo	1.41	1.60	1.84	1.22	2.25	3 433	3 020	2 622	3 954	2 149
	Lebanon	1.39	4.35	5.67	1.07	6.06	3 266	1 044	802	4 252	750
	Lithuania	1.38	3.42	4.35	1.09	4.73	4 712	1 910	1 501	5 995	1 379
	Macao	1.30	0.66	0.56	1.55	0.86	3 432	6 787	8 051	2 893	5 204
	Malaysia	2.26	6.46	13.33	1.09	14.59	3 923	1 372	665	8 096	607
	Malta	1.27	0.70	0.61	1.43	0.88	2 872	5 227	5 915	2 538	4 131
	Moldova	1.65	2.41	3.33	1.20	3.98	3 221	2 211	1 599	4 451	1 337
	Montenegro	1.82	0.89	0.79	2.04	1.61	3 109	6 396	7 155	2 779	3 510
	Peru	2.52	2.99	6.01	1.25	7.53	2 768	2 332	1 160	5 565	926
	Qatar	2.44	0.82	0.56	3.56	2.01	4 943	14 710	21 442	3 391	6 018
	Romania	1.44	6.52	8.94	1.05	9.38	3 386	748	545	4 647	520
	Russia	1.62	5.20	7.82	1.08	8.45	3 719	1 160	772	5 591	715
	Singapore	1.55	0.93	0.89	1.62	1.44	3 936	6 579	6 868	3 771	4 235
	Chinese Taipei	2.46	2.71	5.22	1.28	6.68	3 130	2 841	1 477	6 021	1 154
	Thailand	1.70	6.74	10.74	1.06	11.43	4 862	1 224	768	7 746	722
	Trinidad and Tobago	1.45	0.70	0.56	1.79	1.01	3 247	6 728	8 339	2 620	4 656
	Tunisia	1.48	4.47	6.13	1.08	6.60	3 639	1 202	878	4 987	814
	United Arab Emirates	2.43	3.62	7.38	1.19	8.81	5 819	3 914	1 920	11 861	1 608
	Uruguay	2.27	2.22	3.77	1.34	5.04	2 671	2 732	1 609	4 534	1 204
	Viet Nam	1.54	10.71	15.97	1.03	16.51	3 778	544	365	5 635	353

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.
2. See note 1 under Table 11.1.

Table 11.14 Design effects and effective sample sizes for reading literacy

	Country	Design effect 1	Design Efect 2	Design effect 3	Design effect 4	Design effect 5	Sample size 1	Sample size 2	Sample size 3	Sample size 4	Sample size 5
OECD	Australia	2.40	1.64	2.54	1.55	3.94	6 065	8 836	5 712	9 382	3 688
	Austria	1.97	2.80	4.54	1.21	5.51	3 558	2 506	1 544	5 774	1 273
	Belgium	1.37	4.11	5.24	1.07	5.61	7 069	2 350	1 841	9 022	1 721
	Canada	2.56	4.82	10.77	1.14	12.33	7 836	4 163	1 862	17 521	1 626
	Chile	1.35	4.48	5.71	1.06	6.06	5 209	1 575	1 235	6 641	1 163
	Czech Republic	1.41	3.27	4.20	1.10	4.62	4 882	2 108	1 640	6 279	1 493
	Denmark	1.63	3.74	5.46	1.12	6.08	4 398	1 917	1 313	6 421	1 177
	Estonia	1.64	2.19	2.95	1.22	3.59	3 413	2 548	1 892	4 596	1 557
	Finland	1.12	3.87	4.21	1.03	4.33	5 256	1 521	1 397	5 720	1 359
	France	1.34	2.28	2.72	1.13	3.06	4 551	2 680	2 249	5 425	1 997
	Germany	1.45	4.08	5.45	1.08	5.90	4 511	1 599	1 197	6 029	1 106
	Greece	1.35	8.01	10.45	1.03	10.80	4 103	691	529	5 354	512
	Hungary	1.51	2.81	3.74	1.14	4.25	3 744	2 013	1 514	4 977	1 332
	Iceland	1.24	1.08	1.10	1.22	1.35	2 708	3 120	3 064	2 757	2 506
	Ireland	1.72	2.73	3.98	1.18	4.70	3 341	2 099	1 442	4 863	1 222
	Israel	1.18	6.25	7.18	1.02	7.36	5 603	1 056	919	6 439	897
	Italy	2.68	3.54	7.79	1.22	9.47	4 326	3 276	1 487	9 530	1 223
	Japan	1.41	5.63	7.54	1.05	7.95	4 705	1 181	882	6 302	836
	Korea	2.02	3.60	6.26	1.16	7.28	2 760	1 550	892	4 797	767
	Latvia	1.39	1.58	1.81	1.21	2.20	3 506	3 074	2 689	4 009	2 214
	Luxembourg	1.54	0.63	0.43	2.25	0.97	3 447	8 415	12 302	2 357	5 473
	Mexico	2.34	3.55	6.96	1.19	8.30	3 234	2 135	1 088	6 346	912
	Netherlands	1.47	2.09	2.60	1.18	3.07	3 659	2 580	2 072	4 558	1 753
	New Zealand	1.27	1.87	2.10	1.13	2.37	3 561	2 422	2 153	4 006	1 908
	Norway	1.47	2.39	3.05	1.15	3.52	3 707	2 281	1 790	4 725	1 550
	Poland	1.58	2.18	2.86	1.20	3.45	2 828	2 058	1 565	3 720	1 300
	Portugal	2.01	3.12	5.27	1.19	6.29	3 638	2 346	1 389	6 144	1 165
	Puerto Rico (United States)[1]	1.35	5.72	7.36	1.05	7.71	1 038	244	190	1 335	181
	Slovak Republic	1.39	3.36	4.29	1.09	4.67	4 569	1 888	1 482	5 821	1 358
	Slovenia	1.63	1.01	1.02	1.61	1.65	3 939	6 312	6 255	3 975	3 881
	Spain	1.72	2.87	4.21	1.17	4.93	3 917	2 348	1 599	5 753	1 366
	Sweden	1.31	4.86	6.08	1.05	6.39	4 153	1 122	898	5 190	854
	Switzerland	1.50	3.74	5.12	1.10	5.62	3 896	1 569	1 146	5 334	1 043
	Turkey	1.37	9.96	13.27	1.03	13.64	4 302	592	444	5 735	432
	United Kingdom	3.06	3.79	9.55	1.22	11.61	4 625	3 732	1 482	11 644	1 219
	United States	1.34	4.96	6.31	1.05	6.65	4 262	1 151	905	5 420	859
Partners	Albania	1.57	6.07	8.96	1.06	9.53	3 322	859	582	4 903	547
	Algeria	1.96	4.81	8.45	1.11	9.40	2 823	1 147	653	4 959	587
	Argentina	1.27	6.59	8.08	1.03	8.35	5 013	963	786	6 146	761
	Brazil	4.68	3.72	13.75	1.27	17.44	4 942	6 214	1 683	18 254	1 327
	B-S-J-G (China)	1.41	15.50	21.44	1.02	21.85	6 982	635	459	9 657	450
	Bulgaria	1.58	7.12	10.69	1.05	11.27	3 746	832	555	5 622	526
	Colombia	2.26	5.60	11.41	1.11	12.67	5 211	2 107	1 034	10 619	931
	Costa Rica	1.39	5.48	7.21	1.05	7.59	4 953	1 254	953	6 517	904
	Croatia	1.34	3.78	4.72	1.07	5.05	4 341	1 538	1 232	5 420	1 149
	Cyprus[2]	1.54	0.95	0.93	1.58	1.47	3 628	5 839	5 994	3 534	3 802
	Dominican Republic	1.44	4.26	5.69	1.08	6.13	3 295	1 112	832	4 401	773
	FYROM	1.34	0.80	0.74	1.45	1.07	3 988	6 624	7 215	3 662	4 962
	Georgia	1.57	2.76	3.76	1.15	4.33	3 395	1 923	1 413	4 621	1 228
	Hong Kong	1.37	3.85	4.89	1.07	5.26	3 925	1 391	1 095	4 987	1 019
	Indonesia	1.94	4.77	8.32	1.11	9.25	3 359	1 365	783	5 852	704
	Jordan	2.01	3.49	6.01	1.17	7.02	3 610	2 083	1 209	6 219	1 035
	Kazakhstan	3.52	4.04	11.69	1.22	14.21	2 230	1 941	671	6 452	552
	Kosovo	1.34	1.44	1.60	1.21	1.94	3 598	3 342	3 024	3 976	2 491
	Lebanon	1.56	4.26	6.08	1.09	6.64	2 918	1 066	747	4 164	684
	Lithuania	1.22	4.49	5.26	1.04	5.48	5 350	1 452	1 240	6 264	1 190
	Macao	1.54	0.67	0.50	2.08	1.04	2 908	6 638	8 976	2 150	4 312
	Malaysia	1.97	8.30	15.36	1.06	16.33	4 503	1 068	577	8 336	543
	Malta	1.20	0.66	0.59	1.34	0.79	3 028	5 512	6 149	2 715	4 593
	Moldova	1.29	2.74	3.24	1.09	3.53	4 135	1 945	1 645	4 890	1 510
	Montenegro	1.81	0.88	0.78	2.04	1.60	3 123	6 441	7 249	2 775	3 550
	Peru	1.65	4.43	6.66	1.10	7.31	4 226	1 573	1 046	6 352	953
	Qatar	1.44	0.71	0.58	1.76	1.03	8 372	17 008	20 757	6 860	11 785
	Romania	1.33	6.71	8.59	1.04	8.93	3 663	727	567	4 695	546
	Russia	1.66	4.51	6.84	1.10	7.50	3 630	1 338	883	5 503	805
	Singapore	1.72	0.97	0.95	1.76	1.68	3 549	6 282	6 409	3 478	3 646
	Chinese Taipei	1.35	4.11	5.18	1.07	5.53	5 723	1 877	1 487	7 225	1 394
	Thailand	2.14	6.77	13.37	1.09	14.52	3 849	1 218	617	7 599	568
	Trinidad and Tobago	1.29	0.74	0.67	1.43	0.96	3 636	6 316	7 022	3 271	4 895
	Tunisia	3.07	2.47	5.52	1.37	7.58	1 752	2 175	974	3 909	709
	United Arab Emirates	2.39	4.37	9.05	1.15	10.44	5 925	3 244	1 565	12 280	1 357
	Uruguay	1.41	3.00	3.82	1.11	4.22	4 303	2 022	1 589	5 475	1 435
	Viet Nam	1.48	10.41	14.91	1.03	15.38	3 942	560	391	5 645	379

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.
2. See note 1 under Table 11.1.

Table 11.15 Design effects and effective sample sizes for collaborative problem solving

	Country	Design effect 1	Design Efect 2	Design effect 3	Design effect 4	Design effect 5	Sample size 1	Sample size 2	Sample size 3	Sample size 4	Sample size 5
OECD	Australia	2.74	1.71	2.93	1.59	4.67	5 311	8 513	4 953	9 129	3 112
	Austria	1.77	2.67	3.97	1.20	4.74	3 950	2 622	1 767	5 863	1 478
	Belgium	1.69	3.36	4.99	1.14	5.68	5 711	2 873	1 935	8 478	1 700
	Canada	2.59	3.69	7.97	1.20	9.55	7 749	5 434	2 518	16 723	2 099
	Chile	3.04	2.38	5.21	1.39	7.24	2 321	2 958	1 355	5 069	974
	Czech Republic	1.75	2.31	3.29	1.23	4.04	3 937	2 986	2 094	5 614	1 705
	Denmark	1.81	3.12	4.84	1.17	5.65	3 959	2 294	1 481	6 135	1 268
	Estonia	2.39	1.75	2.80	1.50	4.18	2 342	3 186	1 997	3 737	1 335
	Finland	1.69	2.20	3.02	1.23	3.71	3 478	2 678	1 945	4 787	1 583
	France	2.28	1.56	2.28	1.56	3.56	2 678	3 917	2 684	3 908	1 717
	Germany	2.24	2.32	3.95	1.31	5.18	2 918	2 812	1 652	4 968	1 258
	Greece	1.56	5.41	7.87	1.07	8.43	3 552	1 022	703	5 166	657
	Hungary	1.29	2.67	3.15	1.09	3.43	4 395	2 122	1 799	5 184	1 648
	Iceland	1.82	1.06	1.11	1.73	1.93	1 856	3 173	3 028	1 945	1 747
	Ireland	1.72	4.65	7.30	1.10	8.02	6 717	2 489	1 587	10 537	1 444
	Israel	1.65	4.05	6.02	1.11	6.67	4 032	1 643	1 104	6 001	996
	Italy	2.13	2.38	3.94	1.29	5.07	2 617	2 346	1 416	4 335	1 100
	Japan	2.25	1.37	1.83	1.68	3.09	2 159	3 556	2 657	2 890	1 577
	Korea	1.58	0.75	0.61	1.96	1.19	3 344	7 040	8 715	2 701	4 442
	Latvia	2.41	3.03	5.88	1.24	7.29	3 141	2 501	1 287	6 105	1 038
	Luxembourg	1.41	2.33	2.88	1.14	3.29	3 815	2 308	1 868	4 712	1 635
	Mexico	1.49	1.63	1.93	1.25	2.42	3 036	2 781	2 341	3 607	1 868
	Netherlands	1.88	2.09	3.06	1.29	3.94	2 899	2 605	1 783	4 235	1 384
	New Zealand	2.15	2.84	4.97	1.23	6.12	3 401	2 577	1 475	5 945	1 197
	Norway	1.37	3.04	3.78	1.10	4.15	4 649	2 090	1 678	5 790	1 530
	Poland	1.96	1.17	1.33	1.72	2.29	3 275	5 471	4 801	3 731	2 797
	Portugal	1.67	2.41	3.35	1.20	4.01	4 036	2 800	2 013	5 614	1 678
	Puerto Rico (United States)[1]	1.83	3.65	5.86	1.14	6.69	2 980	1 494	931	4 780	816
	Slovak Republic	1.41	8.12	11.07	1.04	11.48	4 166	726	533	5 682	513
	Slovenia	2.44	3.92	8.13	1.18	9.57	5 801	3 611	1 742	12 025	1 480
	Spain	1.67	3.86	5.78	1.12	6.45	3 412	1 482	988	5 115	885
	Sweden	1.31	4.86	6.08	1.05	6.39	4 153	1 122	898	5 190	854
	Switzerland	1.50	3.74	5.12	1.10	5.62	3 896	1 569	1 146	5 334	1 043
	Turkey	1.37	9.96	13.27	1.03	13.64	4 302	592	444	5 735	432
	United Kingdom	3.06	3.79	9.55	1.22	11.61	4 625	3 732	1 482	11 644	1 219
	United States	1.34	4.96	6.31	1.05	6.65	4 262	1 151	905	5 420	859
Partners	Brazil	3.57	4.49	13.45	1.19	16.02	6 491	5 151	1 720	19 435	1 445
	B-S-J-G (China)	1.57	10.55	15.96	1.04	16.53	6 280	933	617	9 503	595
	Bulgaria	1.27	7.23	8.92	1.03	9.19	4 664	820	665	5 753	645
	Colombia	1.25	7.30	8.87	1.03	9.12	9 443	1 616	1 330	11 473	1 294
	Costa Rica	2.32	2.88	5.36	1.25	6.68	2 964	2 382	1 281	5 512	1 028
	Croatia	1.60	3.03	4.26	1.14	4.87	3 620	1 916	1 363	5 087	1 194
	Cyprus[2]	1.91	1.03	1.05	1.86	1.95	2 924	5 429	5 307	2 991	2 850
	Hong Kong	1.75	3.25	4.95	1.15	5.70	3 057	1 647	1 082	4 652	940
	Lithuania	1.56	3.08	4.24	1.13	4.79	4 190	2 120	1 540	5 766	1 361
	Macao	1.35	0.64	0.52	1.67	0.86	3 327	6 978	8 647	2 685	5 187
	Malaysia	1.68	9.06	14.52	1.05	15.19	5 281	979	610	8 466	583
	Montenegro	1.66	0.88	0.80	1.82	1.45	3 418	6 456	7 108	3 104	3 895
	Peru	1.58	3.96	5.69	1.10	6.27	4 408	1 759	1 226	6 324	1 112
	Russia	1.67	4.97	7.64	1.09	8.31	3 614	1 213	790	5 549	727
	Singapore	1.22	0.79	0.75	1.29	0.96	5 026	7 735	8 206	4 737	6 358
	Chinese Taipei	1.84	3.15	4.96	1.17	5.80	4 185	2 449	1 555	6 589	1 329
	Thailand	2.16	6.72	13.36	1.09	14.52	3 820	1 227	618	7 590	568
	Tunisia	1.57	3.71	5.25	1.11	5.82	3 428	1 449	1 024	4 850	924
	United Arab Emirates	2.05	4.52	8.24	1.13	9.29	6 896	3 132	1 720	12 560	1 525
	Uruguay	1.38	2.79	3.46	1.11	3.84	4 400	2 173	1 750	5 466	1 578

1. Puerto Rico is an unincorporated territory of the United States. As such, PISA results for the United States do not include Puerto Rico.
2. See note 1 under Table 11.1.

Table 11.16 **Design effects and effective sample sizes for financial literacy**

	Country	Design effect 1	Design Efect 2	Design effect 3	Design effect 4	Design effect 5	Sample size 1	Sample size 2	Sample size 3	Sample size 4	Sample size 5
OECD	Australia	1.27	2.98	3.52	1.08	3.80	11 426	4 869	4 124	13 490	3 828
	Chile	1.81	3.81	6.10	1.13	6.91	3 887	1 852	1 157	6 222	1 021
	Italy	2.02	4.53	8.15	1.13	9.17	5 722	2 557	1 422	10 289	1 263
	Netherlands	1.58	2.06	2.67	1.22	3.26	3 401	2 618	2 014	4 420	1 653
	Poland	1.48	2.57	3.32	1.14	3.79	3 033	1 743	1 350	3 916	1 181
	Slovak Republic	2.35	2.93	5.52	1.24	6.86	2 708	2 170	1 151	5 105	925
	Spain	1.55	3.63	5.08	1.11	5.64	4 342	1 854	1 325	6 077	1 195
	United States	1.16	5.87	6.64	1.02	6.80	4 930	973	860	5 579	840
Partners	Brazil	3.32	6.52	19.33	1.12	21.65	6 970	3 548	1 197	20 662	1 069
	B-S-J-G (China)	2.07	10.66	21.02	1.05	22.10	4 746	924	468	9 363	445
	Lithuania	1.80	3.42	5.37	1.15	6.18	3 616	1 906	1 214	5 675	1 056
	Peru	1.67	4.12	6.20	1.11	6.87	4 180	1 693	1 124	6 293	1 015
	Russia	1.56	5.25	7.64	1.07	8.21	3 861	1 150	790	5 622	735

To better understand the design effect for a particular country, some information related to the design effects and their respective effective sample sizes are presented in Annex C. In particular, the design effect and the effective sample size depend on:

- **The sample size,** the number of participating schools, the number of participating students and the average within-school sample size, which are provided in Table C.2 (Annex C);
- **The school variance,** school variance estimates and the intraclass correlation, which are provided respectively in Tables C.3 and C.4 (Annex C);
- **The stratification variables,** the intraclass correlation coefficient within explicit strata and the percentage of school variance explained by explicit stratification variables, which are provided respectively in Tables C.5 and C.6 (Annex C).

Finally, the standard errors on the mean performance estimates are provided in Table C.1 (Annex C).

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